



**AN INVESTIGATION OF AIR FORCE COMMUNITIES OF PRACTICE:  
A DESCRIPTIVE STUDY OF EVOLUTION THROUGH ASSESSMENT  
OF PEOPLE, PROCESS, AND TECHNOLOGY CAPABILITIES**

THESIS

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AFIT/GIR/ENV/03-11

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THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Information Resource Management

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March 2003

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## **Acknowledgments**

I would like to express my sincere appreciation to my faculty advisor, Lt. Col. Summer E. Bartczak, for her guidance, support, and patience throughout the course of this thesis effort. Special thanks also go to the rest of my thesis committee Dr. Alan Heminger and Maj Paul Thurston. The insight and experience was certainly appreciated. I would, also like to thank my sponsor, Randy Adkins and his staff, from the Air Force Materiel Command for both the support and latitude provided to me in this endeavor.

I am, also, indebted to my loving wife whose patience and sacrifice was very much appreciated.

Jason R. May

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### **Abstract**

A variety of theories state that communities of practice (CoPs) “evolve” or “mature” through various stages over time. Such theories posit that each stage is characterized by different people, process, and technology attributes/capabilities that ultimately necessitate differing strategies for achieving effectiveness (Gongla and Rizzuto, 2001). A primary goal of AFMC/DRW, AFMC Electronic Learning (eLearning) Knowledge Management Integrated Project Team, and the office of the Air Force Chief Information Officer is to increase CoP participation and effectiveness.

This descriptive, cross-sectional research, surveyed all CoP managers of all CoPs “hosted” by AFMC/DRW with a quantitative/qualitative, 86 question, 5-point Likert, survey. This research suggested that, on average, AF/AFMC CoPs are in the very early stages of evolution, and the extent of implementation for stage-specific attributes/capabilities was found to be minimal. The implications of this finding show, given the relatively “undeveloped nature” of many of the CoPs, there are a wide range of actions that can be taken to improve the efficiency and effectiveness of existing CoPs. These actions include increasing leadership involvement and support, increasing membership education and training, defining more clearly the purpose/objectives of each CoP, and implementing easier technology tools for navigating the COP collaborative electronic workspace.

# AN INVESTIGATION OF AIR FORCE COMMUNITIES OF PRACTICE: A DESCRIPTIVE STUDY OF EVOLUTION THROUGH ASSESSMENT OF PEOPLE, PROCESS, AND TECHNOLOGY CAPABILITIES

## **I. Introduction**

### **Overview**

Etienne Wenger, who is credited with inventing the term “Community of Practice” (CoP), defines a CoP as a group of people who both share an interest in a domain of human endeavor, and engage in a process of collective learning that creates bonds among them. These people come together to collaborate, share, innovate new ideas, and solve problems (Wenger, 1998a).

Organizations within the United States Air Force (AF) are interested in encouraging the proliferation and utilization of CoPs, where appropriate, to augment current organization learning/knowledge management initiatives. Furthermore, these organizations are looking for guidance/recommendations as how to improve the effectiveness of existing CoPs so that they best serve the participants and the purposes/organizations they have evolved to serve. Given that CoPs are not a new phenomenon, but the recognition of them is (Brailsford, 2001), it is understandable that organizations are unsure of the best ways to improve the effectiveness of these existing CoPs. In order to identify and develop ways to improve CoPs, identification of their current stage of evolution is necessary (Gongla and Rizzuto, 2001). In doing so, it will establish a foundational guidance that may be used to design plans and strategies that can advance and enhance Air Force and AFMC CoPs through their most productive stages.

The rewards of facilitating more robust and active CoPs will not only afford benefits to these organizations, but also to the individuals participating in the CoPs.

## **Background**

The worldwide environment is now typified by drastic and sporadic change. These changes require anticipatory responses (AFMC, 2002). In order to survive and adapt in the new environment, organizations must strive for continuous learning. This is achieved, in some instances, through the employment of (information system-based) knowledge management systems that support collaboration for communication building, people networks, and on-the-job learning. Electronic-based CoPs (referred to as CoPs from this point forward) can be seen as one type of an organizational information system-based knowledge management system.

The AFMC Electronic Learning (eLearning) Knowledge Management Integrated Project Team (IPT) (referred to as AFMC, for short, from this point forward) and the office of the Air Force Chief Information Officer (referred to as AFCIO from this point forward) want to identify ways electronic-based CoPs can become more effective. AFMC and AFCIO would like to take the necessary steps to improve the effectiveness of these CoPs so that they can reach their fullest potential as quickly as possible. They are unsure, however, how to accomplish this goal.

## **Problem Statement**

CoPs have been shown to “evolve” or “mature” through various stages. Each stage is characterized by different attributes and/or capabilities, which identify different strategies for achieving effectiveness (Gongla and Rizzuto, 2001). The many existing AF

CoPs are at different stages of evolution. Before prescriptions for improving effectiveness can be developed, CoPs must be evaluated pertaining to their current “state of evolution.” Again, AFCIO and AFMC want to increase the use, effectiveness and efficiency of existing CoPs.

The motivation behind this research is to provide guidance to AFCIO and AFMC to help them reach their goal. As such, the purpose of this thesis is to survey Air Force CoP practitioners, with regards to Gongla and Rizutto’s established attributes/capabilities, to determine which of the numerous stages of evolution these particular CoPs are in, and/or determine the need for the addition of unidentified/different attributes/capabilities. These results can then be used by AFMC and AFCIO to determine future strategies and objectives necessary to promote the continued use, development, and improvement of CoPs to support important aspects of the AF mission.

## **Research Questions**

This thesis research will attempt to answer the following specific questions:

1. At what stage of evolution are individual AF/AFMC CoPs perceived to be?
2. What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?
3. For each CoP in a perceived stage of evolution, what is the extent of implementation of appropriate people, process, and technology capabilities?
4. In general, are perceptions about the individual CoP perceived stage of evolution and the choice of people, process, and technology capabilities consistent with Gongla and Rizutto's model?
5. What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?

## **Scope**

This research effort will develop a list of attributes/capabilities for each stage of CoP evolution. Identification of people, processes, and technology attributes/capabilities will be the focus of this effort. To do so, the research will identify and review existing CoP theory and practice within the commercial sector, with the intent of identifying the attributes/capabilities that are essential to successful CoPs. The results will be used as a foundation for assessing the current status of AF CoPs, as perceived by currently practicing AF CoP managers.

Although it would be beneficial for AFMC and AFCIO to receive recommendations for improving their existing CoPs, the purpose of this research effort is, however, limited to providing a basic assessment of the status" or "maturity" of those

existing CoPs. As such, the scope of this research is limited to identifying appropriate stages of evolution through the assessment of previously identified people, process, and technology attributes/capabilities. In doing so, this research can provide a baseline assessment that can act as a foundation or status quo for future efforts directed at improving knowledge sharing and collaboration via CoPs.

### **Benefits to the Air Force**

Some organizations that have instituted CoPs have experienced benefits such as reduced costs, improved quality, enhanced innovation, better transfer of knowledge, and increased value to their customers (Wenger, 1998a). Individuals participating in CoPs can experience faster learning, collaborative innovation, better networking, less time looking for information, a wider information base available for consideration, and a greater sense of connection with peers (Wenger, 1998a). The results of this research may help AFCIO and AFMC to better understand the current status of existing CoPs and also to determine strategies and objectives for nurturing CoPs to their fullest potential. It is also anticipated that this research may be generalizable to other military services and DoD organizations trying to implement new CoPs and enhance existing ones.

### **Summary**

This chapter discussed the background of CoPs, stated the research problem, and stated the research questions. Furthermore, this chapter discussed advantages for the Air Force, the scope of the thesis, the research methodology used, and discussed the impact of the results.



Next, a literature review will be presented in Chapter 2. The scope of the literature review represents the major thinking of experts and academics from peer-reviewed journal articles and books as it is applicable to this research effort. After the literature review, Chapter 3 will discuss the research methodology. Chapter 4 will provide the results of the research and analysis. Finally, Chapter 5 will discuss the implications of the research, as well as future research possibilities

## **II. Literature Review**

### **Introduction**

This thesis research attempts to answer what stages of evolution are AF CoPs currently in and how well they have implemented the people, processes, and technology capabilities for their identified stage. In addition, this research attempts to identify trends in evolution across all sampled AF CoPs, and what trends exist by evolutionary stage in all sampled CoPs. This research also attempts to find what AF CoP managers perceive as critical issues in the evolution of AF CoPs. The scope of this literature review represents the major thinking of experts and academics from peer-reviewed journal articles and books discussing CoPs. The information in this literature review provides the background and evolution theory of CoPs, describes the models/theories used as a basis for survey instrument development, and provides general information about past and present AF and AFMC CoP challenges and research.

### **Defining Communities of Practice**

Etienne Wenger and William Snyder define a Community of Practice (CoP) as a group of people who share an interest in a domain of human endeavor and engage in a process of collective learning that creates bonds between them. These people come together to collaborate, share, and innovate new ideas (Wenger, 1998b).

The basis of CoP formation and operation is learning and developing new knowledge together (Sawhney and Prandelli, 2000). Sawhney and Prandelli compare it to a “gated community” where members can move about freely inside the community, but only if they have fulfilled some predetermined access rules. This community is

closed to outsiders and has certain regulations for membership (Sawhney and Prandelli, 2000). They go on to state that requirements are necessary in the development of a CoP.

These requirements are (Sawhney and Prandelli, 2000):

- a common interest
- a sense of belonging
- an explicit economic purpose
- a sponsor
- a shared language
- ground rules for participation
- mechanisms to manage intellectual property rights
- physical support of the sponsor
- co-operation as a key success factor

By using information technology, the CoP starts by reconfiguring cognitive labor (Sawhney and Prandelli, 2000). The organization transforms into a “relational intelligence that leverages existing knowledge and builds new knowledge through processes of socialization (Sawhney and Prandelli, 2000).”

CoPs have been around for centuries in some shape or form. We all belong to CoPs whether we realize it or not. Doctors who gather to discuss a new medical treatment or teachers who gather to discuss the coming school year’s curriculum are both examples. Most people do not recognize the term CoP, or that they may be part of one, being that it is a relatively new term. However, CoPs are increasing in popularity due to the advantages they provide to business organizations such as reducing costs, improving quality, innovating new ideas, and quick response to customer needs (Lesser and Storck, 2001). Because of these advantages, organizations are attempting to make their CoPs as robust as possible by gaining top management support, holding face-to-face meetings, publishing the CoPs innovations, holding knowledge fairs, and reaching out/communicating to other CoPs.

## Communities of Practice Compared to Other Collaborative Entities

According to Wenger and Snyder (2000), CoPs are not necessarily teams or work groups. CoPs can complement teams, work groups, and informal networks, but they have different characteristics which are all their own. Table #1 compares the characteristics of CoPs to those of work groups, project teams, and networks and shows the purpose, who belongs, what holds it together, and how long each type lasts (Wenger and Snyder, 2000).

**Table #1. A Snapshot Comparison of CoPs and Other Collective Entities  
(Wenger and Snyder, 2000)**

	<b>What is the purpose?</b>	<b>Who belongs?</b>	<b>What holds it together?</b>	<b>How long does it last?</b>
<b>Community of practice</b>	To develop members' capabilities; to build and exchange knowledge	Members who select themselves	Passion, commitment, and identification with the group's expertise	As long as there is interest in maintaining the group
<b>Formal work group</b>	To deliver a product or service	Everyone who reports to the group's manager	Job requirements and common goals	Until the next reorganization
<b>Project Team</b>	To accomplish a specified task	Employees assigned by senior management	The project's milestones and goals	Until the project has been completed
<b>Informal network</b>	To collect and pass on business information	Friends and business acquaintances	Mutual needs	As long as people have a reason to connect

CoPs are made up of volunteers who are similar to each other with common interests that bring them together. A certain subject that involves all of them links these participants. Furthermore, the goals of any CoP can be broad and may often fluctuate (Wenger and Snyder, 2000).

According to Wenger, Snyder, and McDermott (2002), CoPs have three dimensions: domain, community, and practice. The domain is defined as the mutual area of interest about which members care. The community defines who the members are. The practice involves how the community does its work. In addition, CoPs should demonstrate three elements of competency (Wenger, 2000). First, the members must understand what their CoP is about well enough to make worthwhile contributions to it. Second, members must interact. They must build the CoP by mutually engaging with each other. Finally, a CoP must have mutual resources and use them appropriately (Wenger, 2000).

CoPs bind members together for interaction and sharing of resources. Some organizations that have established communities of practice have experienced reduced costs, an improvement in quality, innovation, and the transfer of knowledge, as well as an increased value to their customers (Wenger, 1998b). Individuals experience faster learning, collaborative innovation, better networking, less time looking for information, a wider spectrum of available information, and a greater sense of connection with peers (Wenger, 1998b). It is understandable that CoPs could bring similar benefits to the AF. CoPs are important because they add value by making knowledge available throughout the organization. Recently, theorists have said that knowledge is a primary source of competitive advantage. They argue that the entire economy is based progressively more

on knowledge production (Sawhney and Prandelli, 2000). Wenger and Snyder state that in the past five years, CoPs have improved organizational performance in a variety of organizations. The following section describes how they can do so.

### **How Communities of Practices Add Value to Organizations**

CoPs add value to organizations in many ways (Wenger and Snyder, 2000).

1. CoPs help drive strategy. As organizations turn their strategies towards leveraging their knowledge capital and utilizing it to its fullest potential, the CoPs, which deal with knowledge creation and sharing, will become more involved in advancing that strategy. For example, the World Bank uses CoPs extensively. The World Bank CoP program existed as small, fragmented CoPs that had existed for quite awhile but have since changed (Wenger and Snyder, 2000). The World Bank has the goal of becoming the “knowledge bank” by providing expert economic information. Knowledge management is the key to attaining this goal. By promoting and funding CoPs, the number of communities throughout the organization increased dramatically to over 100 CoPs. In a two-year period, 1997 to 1999, a dramatic increase in the CoPs activity level was also observed (Wenger and others, 2002). By emphasizing and providing lending/economic information and knowledge, the CoPs will progressively give more to the bank’s intended future path and help drive organizational strategy (Wenger and Snyder, 2000).

2. CoPs help start new lines of business. For example, consultants, in retail marketing, in the banking industry formed a CoP that concentrated on fresh business opportunities for customers (Wenger and Snyder, 2000). Since its inception, four years

prior, with five to seven consultants, the CoP grew to 200 members and discovered an innovative line of marketing methods for financial services companies (Wenger and Snyder, 2000). Providing marketing methods to financial services companies was a new line of business and a departure from the original intent of finding business opportunities for banks. This CoP acted as a catalyst that spawned an increase in customers, fashioned strategies, and bettered the firm's reputation (Wenger and Snyder, 2000).

3. CoPs help individuals solve problems more quickly. Members within a CoP know where to go, and who to inquire upon, for help. Members also know what questions are essential and what questions their peers can comprehend and answer quickly (Wenger and Snyder, 2000). Members of a CoP at Buckman Labs, which contains worldwide members, have a twenty-four hour turn around time for answering practice-specific questions. Often these answers provide the exact solution needed (Wenger and Snyder, 2000).

4. CoPs facilitate the transfer of best practices. Chrysler used this in the early 1990s by organizing around car platforms. Leaders felt that the company would lose functional expertise and the ability to stay current with leading technology (Wenger and Snyder, 2000). CoPs called "tech clubs," were formed to join experts from different car platforms together. By doing this, research and development costs and development cycles were cut (Wenger and Snyder, 2000). These tech clubs also made the integration of DaimlerChrysler much smoother and comprehensive. Engineers who are members of the clubs maintain a Book of Knowledge, which is a database for capturing information and best practices (Wenger and Snyder, 2000).

5. CoPs help develop professional skills. Peers, mentors, and coaches are needed to maintain effective learning. This is true and necessary for novices as well as for experts (Wenger and Snyder, 2000). For instance, doctors rarely rely on their own opinions. They often seek the opinions of their peers and constantly read journals that provide up to date information. Doctors also attend conferences with their contemporaries and seek out other doctors who use the latest methods (Wenger and Snyder, 2000). This professional skill development is promoted by CoPs by providing an area where members can share ideas and learn from one another. Many organizations have found CoPs to be successful at promoting professional development (Wenger and Snyder, 2000). CoPs at IBM hold conferences, presentation, dinners, and online discussions so members can trade ideas, learn new skills, and develop interpersonal networks (Wenger and Snyder, 2000).

6. CoPs help companies recruit and retain talent. CoPs have helped American Management Systems retain personnel. Consultants who were planning to leave the organization stayed because peers in a community found tailor-made projects that suited their interests. Other consultants stayed as a result of being invited to join a very exclusive CoP that would allow them to expand their skills and work with new clients (Wenger and Snyder, 2000).

7. CoPs help increase organizational performance and affect business outcomes. This is one of the biggest advantages CoPs can produce. CoPs have been found to influence business outcomes in many ways (Lesser and Storck, 2001). Reducing rework, decreasing the learning curve, spawning new ideas for products and services, and faster response time to customers, are all examples of business outcomes that have been cited in



the literature (Lesser and Storck, 2001). The CoPs within organizations like multinational lending institutions, pharmaceutical firms, and telecom companies have been studied and shown to produce key value outcomes. Faster project delivery, increased innovation, and greater reuse of existing knowledge assets, are some examples of these outcomes (Lesser and Storck, 2001). A listing of key value outcomes for using CoPs is shown in Table #2 (Lesser and Storck, 2001).

**Table #2. Key Value Outcomes of using Communities of Practices  
(Lesser and Storck, 2001)**

Organization	Community	Objectives	Community Activities	Key Value Outcomes
Multinational lending institution	Urban services specialists	Share experience and expertise across similar projects	<ul style="list-style-type: none"> <li>• Held informal lunchtime seminars</li> <li>• Conducted formal training sessions</li> <li>• Facilitated Web site repository</li> <li>• Produced CD of relevant intellectual capital</li> <li>• Captured experiences of retiring practitioners in multimedia</li> </ul>	<ul style="list-style-type: none"> <li>• Faster project delivery</li> <li>• Greater reuse of intellectual capital developed by projects</li> </ul>
Multinational lending institution	Land and real estate specialists	Share experience and expertise across similar projects	<ul style="list-style-type: none"> <li>• Held informal lunchtime seminars</li> <li>• Conducted training sessions</li> <li>• Sponsored conferences with outside speakers</li> <li>• Facilitated Web site</li> <li>• Developed Web links to relevant outside content sources</li> </ul>	<ul style="list-style-type: none"> <li>• Faster project delivery</li> <li>• Greater reuse of intellectual capital developed by projects</li> <li>• Improved linkages to outside knowledge sources</li> </ul>
Manufacturing company	Quality champions	Develop and exchange implementation techniques	<ul style="list-style-type: none"> <li>• Held informal discussions among practitioners</li> <li>• Developed Web sites with relevant training material and advice</li> </ul>	<ul style="list-style-type: none"> <li>• Increased reuse of previously developed assets</li> </ul>
Pharmaceutical firm	Research chemists	Share knowledge about a new industry development	<ul style="list-style-type: none"> <li>• Held face-to-face discussions and meetings to share insights</li> <li>• Used video-conferencing to connect research labs</li> <li>• Maintained Web site, using one of the technologists as a webmaster</li> </ul>	<ul style="list-style-type: none"> <li>• Development of a new business capability based on advanced research techniques</li> </ul>
Software development company	Programmers	Respond to needs for customization of product	<ul style="list-style-type: none"> <li>• Maintained internal listservs for individuals to post comments about modifications</li> <li>• Maintained Web site to support sharing of software components</li> <li>• Provided access to "spearhead" experts around the company</li> </ul>	<ul style="list-style-type: none"> <li>• Greater reuse of existing software assets</li> <li>• Increased innovation around new software products</li> </ul>
Specialty chemical company	Researchers	Share and innovate new solutions to satisfy customer needs	<ul style="list-style-type: none"> <li>• Maintained extensive discussion database where individuals can post and seek answers to customer problems</li> <li>• Employed knowledge brokers and editors to cull through discussion databases and identify frequently asked questions and other knowledge needs</li> <li>• Held informal "breakfast seminars" to share discoveries and engage other researchers in problem solving</li> </ul>	<ul style="list-style-type: none"> <li>• Faster response time to customer problems</li> <li>• Greater linkage between customers and research staff in developing new solutions</li> </ul>
Telecom company	Project managers	Transfer experience and techniques across industry groups	<ul style="list-style-type: none"> <li>• Held initial face-to-face meeting with community members to outline community objectives and opportunities</li> <li>• Developed e-mail-based expert access/question-and-answer system to post and distribute inquiries</li> </ul>	<ul style="list-style-type: none"> <li>• Faster response to project bids and request for proposals</li> <li>• Greater reuse of existing knowledge assets</li> </ul>

The columns in Table #3 show specifically how connections, relationships, and common contexts, make important and unique contributions to the four corresponding areas of organizational performance (Lesser and Storck, 2001). These areas include decreasing the learning curve, increased customer responsiveness, reduced rework and reinvention prevention, and increased innovation, which are all addressed.

**Table #3. How Connections, Relationships, and Common Contexts Correspond to Areas of Organizational Performance (Lesser and Storck, 2001)**

<b>Area of Increased Organizational Performance</b>	<b>Connections</b>	<b>Relationships</b>	<b>Common Context</b>
<b>Decrease learning curve</b>	Find experts	Mentor and coach new employees	Understand rules of the firm
<b>Increase customer responsiveness</b>	Find individuals with similar experiences	Develop willingness to respond to random questions	Understand the common language
<b>Reduce rework and prevent reinvention</b>	Find artifacts and the individuals who developed them	Establish positive reputation	Understand situational nature of knowledge
<b>Increase innovation</b>	Leverage weak ties that provide exposure to new ideas	Build safe environment for brainstorming and testing new ideas	Understand which problems are of common

### **Exploring the Four Areas of Organizational Performance In-Depth**

Lesser and Storck, and the CoP members they questioned, considered CoPs very influential in affecting the four areas of organizational performance in Table #3 (Lesser

and Storck, 2001). In this section, we will explore these four areas in more depth and give examples of the impact CoPs have in these areas.

### **Decreasing the Learning Curve of New Employees.**

Decreasing the learning curve of new employees is an ongoing challenge every organization deals with. With the influx of new personnel on a constant basis, an organization continuously needs to raise the productivity of new members quickly. CoPs can speed the progress of “ramping up” new members and make it easier to learn both the technical and cultural aspects of their new assignments (Wenger and others, 2002). CoPs also foster mentoring relationships with junior personnel, while community membership serves as a screening instrument used by senior employees who are often restricted in the amount of time they can assist new personnel (Lesser and Storck, 2001). CoPs are also found useful in sharing tacit knowledge, the intangible knowledge that is in a person’s head, like tips and “tricks of the trade” that are not found anywhere else (Lesser and Storck, 2001).

### **Responding More Rapidly to Customer Needs and Inquiries.**

Organizations want to excel at responding more rapidly to customer needs and inquiries. Customers at every level expect quick solutions to questions and concerns. CoPs can improve business outcomes by providing quick answers to questions (Wenger and others, 2002). CoPs can take a significant part in rapidly transferring the knowledge necessary to address customer needs (APQC, 2001). CoPs can also help people identify experts quickly in order to get the best answer (Lesser and Storck, 2001). By keeping these questions and answers in an easy to find, central repository, members can reuse this intellectual capital again and again (Lesser and Storck, 2001).

### **Reducing Rework and Preventing "Reinvention of the Wheel".**

Reducing rework and preventing "reinvention of the wheel" is perhaps the most valuable thing that CoPs can do for an organization (Lesser and Storck, 2001). CoPs can provide the capability for personnel to reuse existing knowledge assets more easily (Wenger and others, 2002). Practically all of the communities studied by Lesser and Storck stated the ability to find, access, and apply existing intellectual capital as an important result of community participation (Lesser and Storck, 2001).

### **Spawning New Ideas for Products and Services.**

Spawning new ideas for products and services is another area enhanced by CoPs (APQC, 2001). CoPs provide a breeding ground for innovation (Lesser and Storck, 2001). Organizations can benefit from using CoPs, which provide a forum where individuals are able to contribute to multiple points of view concerning a common subject (Wenger and others, 2002). CoPs have been seen as a safe place to share and challenge different ideas, even if they were not fully developed (Lesser and Storck, 2001). It has been found that members could bounce radical ideas off each other without fear of repercussions and tap into each other for improvements (Wenger and others, 2002). In order to be involved in knowledge creation, exchange, and transformation, a CoP must be an enabler of deep learning in a specific area. At the same time, a CoP must be highly linked with other parts of the organization. The CoP must be a strong center point in this organization-wide process of spawning new ideas (Wenger, 2000).

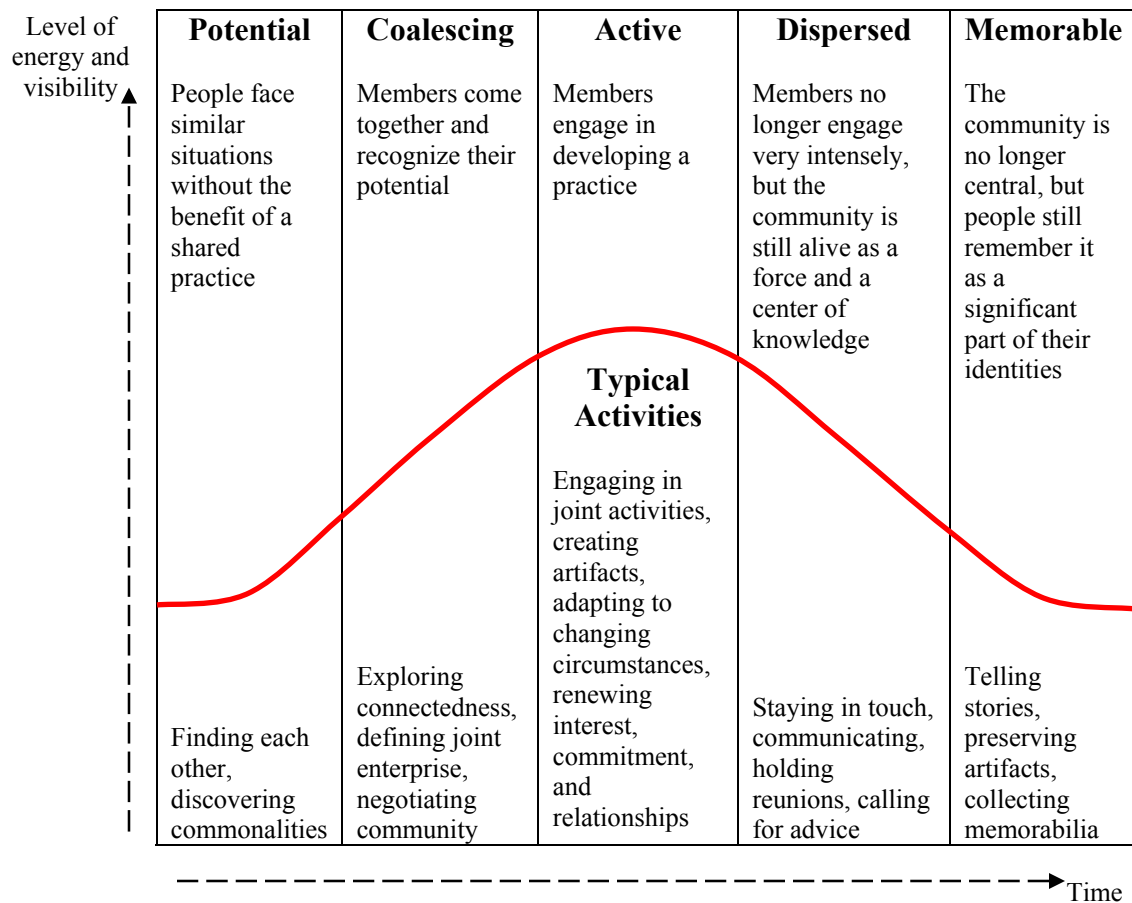
### **Theories Regarding the Evolution of Communities of Practice**

Many different experts in the field of CoPs have asserted that CoPs form and then evolve through various stages. Each of these stages have different characteristics and

goals. Over time, some of these experts have agreed on how CoPs evolve and have joined forces and combined their theories. Other experts have taken a path all their own.

### **Wenger's Theory.**

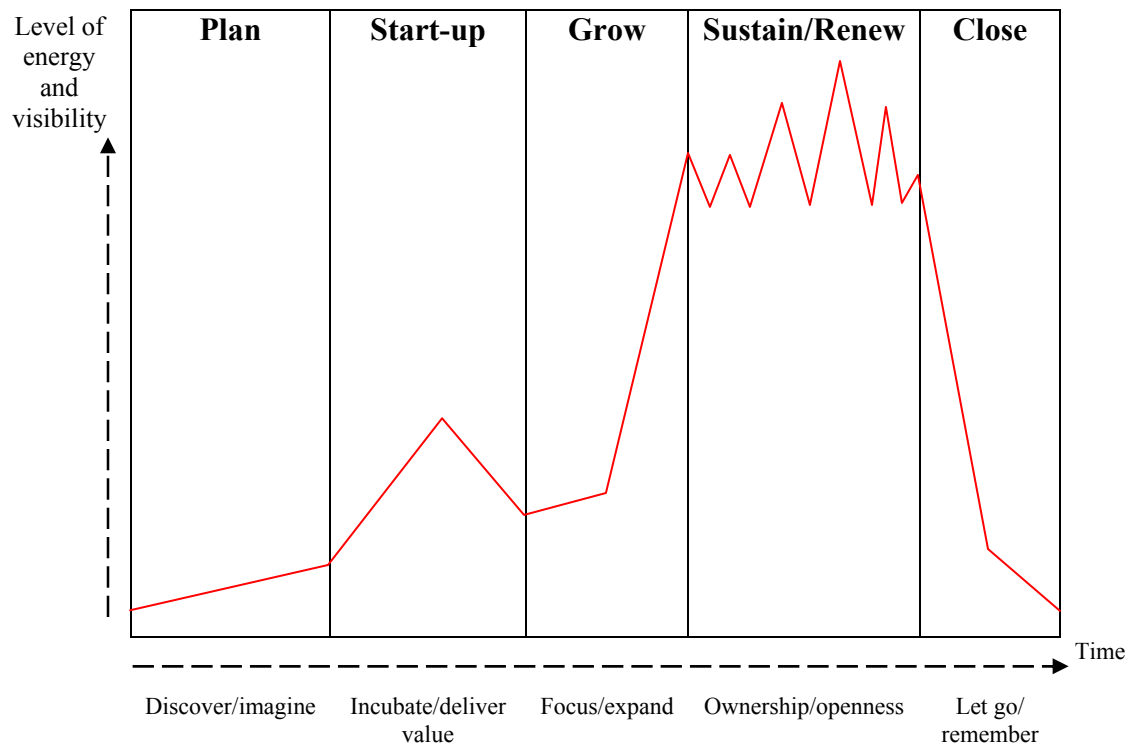
According to Etienne Wenger, CoPs move through various stages of development. Wenger uses a life-cycle concept where the CoP has a beginning and end. "Potential", "Coalescing", "Active", "Dispersed", and "Memorable" are the stages Wenger describes (Wenger, 1998a). These five stages are differentiated by different activities and relations that the members are involved in (Wenger, 1998a). As time progresses and the CoP moves through the different stages, the level of member activities change. Wenger's theory suggests a bell-type curve. Figure #1 below shows Wenger's stages of development and the typical activities associated with them (Wenger, 1998a).



**Figure #1. Stages of CoP Development (Wenger, 1998a)**

### **McDermott's Theory.**

Richard McDermott also presents a theory that CoPs progress through stages of community development. He also presents the stages as a life-cycle, but he depicts them differently. McDermott's model includes five stages labeled "Plan", "Start-up", "Grow", "Sustain/Renew", and "Close" (McDermott, 2000). McDermott asserts that as time progresses and the community moves through the various stages that the level of activity changes. His model depicts that more activity happens near the end of the life-cycle than in the middle. Figure #2 shows McDermott's stages of development (McDermott, 2000).

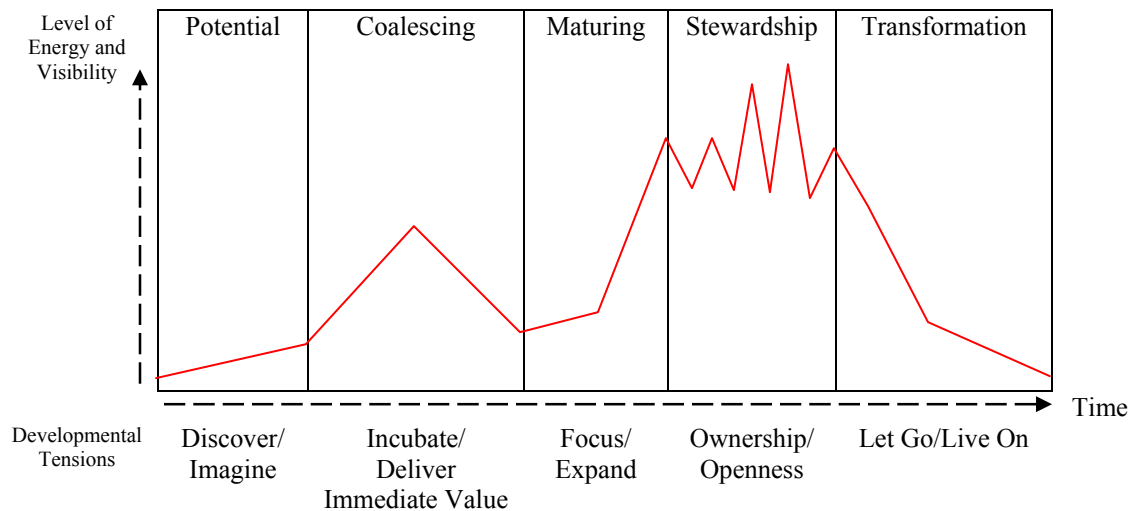


**Figure #2. Stages of CoP Development (McDermott, 2000)**

### **Wenger, Snyder and McDermott's Theory.**

Eventually, Wenger and McDermott were joined by William Snyder, one of Wenger's other writing partners, in 2002. Together they combined their two pre-existing theories into one (Wenger and others, 2002). Again, this new model depicts a life-cycle with five stages but uses different names to describe the stages. Once again, the level of energy and visibility changes as a CoP matures through the evolutionary stages. Figure #3 shows this new theory (Wenger and others, 2002).





**Figure #3. Stages of CoP Development (Wenger and others, 2002)**

### **Gongla and Rizzuto's Theory.**

After working with IBM's Global Services CoP program for five years, studying over sixty CoPs, and focusing particularly on CoP evolution, Gongla and Rizzuto also developed a model of CoP evolution. Gongla and Rizzuto suggest that CoPs do not die at the end of their life-cycle. Instead of dying, evolution occurs (Gongla and Rizzuto, 2001). In the life-cycle models previously discussed, eventually a CoP comes to an end and "dies". With Gongla and Rizzuto's evolutionary model a CoP does not die but merely transforms into something else. This could be a different CoP, multiple CoPs, a workgroup, etc... However, despite the differences, research has shown some commonalities between the life-cycle stage theories and Gongla and Rizzuto's evolution theory. The general characteristics shared between the two theories support a strong foundation theory to describe how CoPs evolve. Gongla and Rizzuto propose a CoP evolution pattern with five stages. The evolution of the CoPs they studied demonstrated a pattern that was centered around an influential equilibrium of people, process, and technology attributes/capabilities. It is this equilibrium that makes up the foundation of

each of the five stages. They label the stages “Potential”, “Building”, “Engaged”, “Active”, and “Adaptive” (Gongla and Rizzuto, 2001). Table #4 shows Gongla and Rizzuto’s Model.

**Table #4. Community Evolution Model Definition (Gongla and Rizzuto, 2001)**

<b><u>Stage</u></b>	<b>Potential</b>	<b>Building</b>	<b>Engaged</b>	<b>Active</b>	<b>Adaptive</b>
<b><u>Definition</u></b>	A community is forming.	The community defines itself and formalizes its operating principles.	The community executes and improves its processes.	The community understands and demonstrates benefits from knowledge management and the collective work of the community.	The community and its supporting organization(s) are using knowledge for competitive advantage.

Table #5 shows the fundamental functions that complement these stages of evolution.

**Table #5. Fundamental Functions for the Stages of Evolution (Gongla and Rizzuto, 2001)**

<b><u>Stage</u></b>	<b>Potential</b>	<b>Building</b>	<b>Engaged</b>	<b>Active</b>	<b>Adaptive</b>
<b><u>Fundamental Function</u></b>	Connection	Memory and context creation	Access and learning	Collaboration	Innovation and generation

Gongla and Rizzuto’s model helps differentiate CoPs in different stages and shows their different characteristics as they evolve through these stages. Because this model is the most practitioner-oriented and is an evolutionary model and not a life-cycle model, it has been chosen as a basis for this research. Additionally, using people, process, and technology capabilities/attributes as a lens through which to examine CoP issues is a popular way to investigate knowledge management/knowledge-sharing processes. Carla

S. O'Dell, Nilly Essaides and C. Jackson Grayson, Jr. have used this approach in their book, *If We Only Knew What We Know*, Free Press, 1998, and George Cho, Hans Jerrell. William Landay also used this approach in a government publication titled, *Program Management 2000: Know The Way: How Knowledge Management Can Improve DoD Acquisition*, a report of the Military Research Fellows, Defense Systems Management College Press, 2000. Both used people, process, and technology enablers as a way to discuss knowledge management issues of which CoPs are a subset.

### **Exploring Gongla's and Rizzuto's Theory In-Depth**

Because Gongla and Rizzuto's model is used as a foundation for this research and specifically as the basis for subsequent survey development, a complete review of the model is provided. Each of the five stages in Gongla's and Rizzuto's model has its own definition, fundamental function, people behavior, process support, and enabling technology attributes (Gongla and Rizzuto, 2001). The categories of definition, fundamental function, people behavior, process support, and enabling technology are shown on the left side of Tables 7, 8, 9, 10, and 11. The right side of each table summarizes the attributes of each category in each particular stage. The following paragraphs describe each stage in-depth.

#### **First Stage - Potential (See Table #6).**

The first stage is labeled the potential stage. This is the stage where a CoP starts to form. People are coming together because of a common interest or goal (Gongla and Rizzuto, 2001). Connection is very important at this stage. The members of this CoP must be able to find each other in order to communicate and cultivate relationships

(Gongla and Rizzuto, 2001). Table #6 shows the applicable attributes/capabilities of this first stage.

**Table #6. Potential Stage Enablers that Promote Connection  
(Gongla and Rizzuto, 2001)**

<b>Stage</b>	<ul style="list-style-type: none"> <li>• Potential</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>• Connection</li> </ul>
<b>People Behavior</b>	<ul style="list-style-type: none"> <li>• Individuals find one another and link up</li> <li>• The organization may be unaware of or uninterested in the potential community</li> </ul> OR <ul style="list-style-type: none"> <li>• The organization may provide some support to locate and introduce individuals</li> </ul>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>• Identifying potential community members</li> <li>• Locating potential community members</li> <li>• Facilitating bringing individuals together</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>• Electronic messaging systems: e-mail, chat rooms, lists</li> <li>• Phone calls and teleconferences</li> <li>• On-line forums</li> <li>• On-line directories</li> </ul>

### **Second Stage – Building (See Table #7).**

The second stage, the building stage, is a point when a CoP defines itself in terms of what it is and what it will do. The CoP also decides how it will set itself apart from other communities. Context creation and memory are important at this stage (Gongla and Rizzuto, 2001). The CoP creates a common vocabulary, roles and norms, and repertoire

together, trying to form a common perception of what the CoP is, why it exists, and how it will work. After putting these things together over a period, a mutual history begins to form (Gongla and Rizzuto, 2001). The members of the CoP can now define what it means to be a member and identify individuals who should/could belong to the CoP (Gongla and Rizzuto, 2001). Table #7 shows the applicable attributes/capabilities of this second stage.

**Table #7. Building Stage Enablers that Promote Memory and Context  
(Gongla and Rizzuto, 2001)**

<b>Stage</b>	<ul style="list-style-type: none"> <li>•Building</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>•Memory and context</li> </ul>
<b>People Behavior</b>	<p>Core members:</p> <ul style="list-style-type: none"> <li>•Learn about each other</li> <li>•Share experiences and knowledge</li> <li>•Build common vocabulary</li> <li>•Create roles and norms</li> <li>•Begin a formal history together and record it</li> <li>•Start a repertoire of stories</li> </ul> <p>The organization recognizes the community.</p>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>•Classifying and storing knowledge</li> <li>•Developing ways to support the knowledge life-cycle</li> <li>•Planning for community operation</li> <li>•Beginning deployment</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>•Common repository</li> <li>•Initial classification and categorization schema tools</li> <li>•Document and library management systems</li> <li>•Collaborative work environment</li> </ul>

**Third Stage – Engaged (See Table #8).**

The engaged stage is where the CoP functions with a common purpose and is sustainable. The CoP grows in size, complexity, and capability (Gongla and Rizzuto, 2001). Access and learning are its fundamental function. By growing, more people have

access to the knowledge the CoP has to offer and can learn from it (Gongla and Rizzuto, 2001). Table #8 shows the applicable attributes/capabilities of this third stage.

**Table #8. Engaged Stage Enablers that Promote Access and Learning  
(Gongla and Rizzuto, 2001)**

<b>Stage</b>	<ul style="list-style-type: none"> <li>• Engaged</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>• Access and learning</li> </ul>
<b>People Behavior</b>	<p>Members:</p> <ul style="list-style-type: none"> <li>• Develop trust in and loyalty to the community</li> <li>• Commit to the community</li> <li>• Outreach to new members</li> <li>• Model knowledge-sharing behavior</li> <li>• Tell community stories</li> <li>• Actively search for and contribute material to build the community knowledge base</li> <li>• Promote and participate in knowledge sharing</li> </ul> <p>The organization interacts with the community and learns of its capabilities.</p>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>• Socializing new members</li> <li>• Managing workflow</li> <li>• Executing life-cycle process for developing and managing knowledge</li> <li>• Supporting tacit knowledge exchange</li> <li>• Developing and disseminating communications</li> <li>• Gathering and managing feedback</li> <li>• Correcting problems and adjusting</li> <li>• Re-examining and modifying community definition and scope</li> <li>• Ensuring self-governance and self-regulation</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>• Portals</li> <li>• Expert and community "yellow pages" or locators</li> <li>• Language translation capabilities</li> <li>• Electronic surveys, polling, and other community-sensing or feedback tools</li> </ul>

#### **Fourth Stage – Active (See Table #9).**

During the active stage, the CoP refines itself even further while contributing to its growing membership. This growing membership is due, in part, to building relationships with other CoPs (Gongla and Rizzuto, 2001). Collaboration is the fundamental function at this stage while the CoP is working to develop and maintain itself. By collaborating on business problems, identifying business opportunities, and tapping into the shared knowledge of the community and its members, the CoP can be more productive in addressing the issues the organization puts before it (Gongla and Rizzuto, 2001). Members must also collaborate to evaluate the CoP itself. They examine the CoP's value and effectively make that value known to the rest of the organization (Gongla and Rizzuto, 2001). Table #9 shows the applicable attributes/capabilities of this fourth stage.



**Table #9. Active Stage Enablers that Promote Collaboration  
(Gongla and Rizzuto, 2001)**

<b>Stage</b>	<ul style="list-style-type: none"> <li>• Active</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>• Collaboration</li> </ul>
<b>People Behavior</b>	<ul style="list-style-type: none"> <li>• Individuals engage other community members to solve problems and do "real work"</li> <li>• The community creates focused work groups</li> <li>• The community connects to and interacts with other communities</li> <li>• The organization actively supports and measures community work</li> <li>• The organization begins to rely on the community's knowledge to contribute to business value</li> </ul>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>• Problem-solving and decision-making</li> <li>• Sensing and assessing the organizational environment</li> <li>• Enhancing community learning and feedback processes</li> <li>• Integrating with organizational processes</li> <li>• Linking with other communities</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>• Electronic meetings</li> <li>• Collaboration tools, such as for issue-based discussion</li> <li>• Team work rooms</li> <li>• Analytical and decision-making tools</li> <li>• Integration of community technology with the applications and technology of the organization</li> </ul>

**Fifth Stage – Adaptive (See Table #10).**

The final stage, the adaptive stage, is where a CoP attains the ability to detect and react to outside circumstances. The CoP is flexible and continuously adjusts to generate knowledge and ways to exploit that knowledge (Gongla and Rizzuto, 2001). This exploitation leads to effective competition and possibly the influencing, redefining, and expanding of, its environment for the organization's benefit. The fundamental function of this stage is innovation (Gongla and Rizzuto, 2001). The CoP creates new business solutions, methods, processes, etc. These innovations can be internal or external to the

organization (Gongla and Rizzuto, 2001). Table #10 shows the attributes/capabilities of this fifth stage.

**Table 10. Adaptive Stage Enablers that Promote Innovation and Generation (Gongla and Rizzuto, 2001)**

<b>Stage</b>	<ul style="list-style-type: none"> <li>• Adaptive</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>• Innovation and generation</li> </ul>
<b>People Behavior</b>	<ul style="list-style-type: none"> <li>• The community changes its environment through creation of new products, new markets, and new businesses.</li> <li>• Members working together advance the knowledge, and even the definition, of their field.</li> <li>• The community sponsors new communities.</li> <li>• The organization uses the community to develop new capabilities and to respond to and influence markets.</li> </ul>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>• Adapting responsively to the environment, exhibiting dynamic stability</li> <li>• Developing advanced boundary processes</li> <li>• Mentoring the formation of new communities</li> <li>• Focusing on innovation</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>• Pilot uses of technology</li> <li>• Integration with the technologies of external organizations</li> <li>• Technology transfer</li> </ul>

### **Communities of Practice Efforts in AFMC and the Air Force**

Now that literature on private sector CoP efforts has been addressed, it is necessary to discuss AF and AFMC specific CoP background material. Headquarters AFMC/DRW is the unit tasked with managing and administering the Air Force

knowledge management (AFKM) program. Not only does it manage AFMC CoPs, but also CoPs for the AF. It is necessary to explore what the AF and AFMC have accomplished up to this point in the area of CoPs.

### **Focus of AF/AFMC CoP Efforts**

The root motivation for the AF and AFMC CoP efforts stem from their desire to “increase the efficiency and effectiveness of the Warfighter workforce by creating and supporting a continuous learning environment using knowledge management tools and processes” (Nguyen, 2002). These efforts are encompassed in a broad effort called Knowledge Now and are lead by the AFMC eLearning Knowledge Management Integrated Project Team (IPT). The focus of the eLearning Knowledge Management IPT is to investigate ways to apply private-sector technologies and management theories to AFMC’s logistical information distribution problems. More specifically, their objective is to investigate current technologies and processes that can provide learning and collaborative tools that may improve the warfighter’s abilities to perform their mission (Nguyen, 2002).

### **History of AF/AFMC CoP Efforts.**

In January 1998, AFMC/DRW created the AFMC Lessons Learned Database. This database provided AFMC personnel on-line access to documented, first-hand experiences focusing on acquisition and logistics subject matter. Nearly 2,000 examples of these first-hand experiences are still available on the AFMC Lessons Learned Database (Nguyen, 2002). The AFMC Lessons Learned Database was originally deployed to support the Air Force efforts in Kosovo. When that mission ended, however, AFMC still wanted to provide critical AFMC information to the warfighter and

warfighter support community. AFMC/DRW wanted to expand the AFMC Lessons Learned Database into a more robust program.

AFMC/DRW started expanding the AFKM program by developing the AFMC Help Center. The AFMC Help Center was made available in February of 2000 to help AFMC and other personnel locate information primarily dealing with acquisitions and logistics. The Help Center presently provides a search capability of over 431,000 non-classified AFMC web pages. The AFMC help Center averages 13,000 hits each month from AF personnel (Nguyen, 2002).

After the success of the AFMC Help Center, AFMC/DRW wanted to advance their efforts even further by providing a web-based collaborative environment. In November of 2001, AFMC/DRW deployed a Community of Practice Tool to make available an ideal way of organizing proceedings of a team or organization effort where members are in various localities and unable to see each other face to face (Nguyen, 2002). The Community of Practice “electronic” workspace that AFMC/DRW built offered customers an electronic collaborative environment where multiple personnel with a particular interest or goal could work together and carry out business through web-based communication (Nguyen, 2002). The electronic CoP workspaces created by AFMC/DRW made available key documents, tools, Air Force Instructions, handbooks, guides, and expert contacts in specific fields to community members. Having these documents and tools available provided an excellent way of coordinating the efforts of people who work in different physical locations (Nguyen, 2002). As of August of 2002, eighty CoP workspaces had been developed for use by customers (Nguyen, 2002).

AF and AFMC CoPs came about through the evolution of the AFMC KM program that was not originally intended to be extended AF-wide. Over a four-year period, AFMC started and maintained a knowledge management program that progressed and evolved over time. The eventual focus of the AFMC/DRW knowledge management program has become the development and sustainment of electronic-based CoPs. The Air Force CIO Office recognized that AFMC already had an impressive foundation for CoPs. This culminated into AFMC becoming the focal point for some AF CoPs as well as AFMC CoPs.

### **Current Efforts with Communities of Practice in AFMC and the Air Force**

Given that the history of the evolution of CoPs in the AF/AFMC has been detailed, it is also necessary to identify current efforts. It is important to understand the current status of AF and AFMC CoP efforts as a departure point for this research.

As of September of 2002, a new website, called Knowledge Now, was deployed. This new website integrated the Help Center, Lessons Learned Database, Air Force Deskbook, and an entry point to CoPs, into one complete resource. Current efforts within the AFMC KM program include the creation of CoP workspaces alongside extensive existing Knowledge Now information resources as a “next logical step” (Nguyen, 2002). AFMC/DRW is also developing a training curriculum for CoPs on the existing program to better educate and inform CoP users and managers. AFMC/DRW is also modifying the Community of Practice workspaces. This will allow updated Air Force content to be accessible via the Knowledge Now website as. This will make all AFMC and DoD acquisition and logistical information even more available and easy to find (Lipka, 2002).

The past and present efforts by AFMC/DRW are aimed towards the objectives set forth in the AFMC eLearning Knowledge Management IPT Project Charter. Again, the AFMC eLearning Knowledge Management IPT was tasked to enhance knowledge management opportunities to support a learning culture in AFMC (AFMC, 2002). The team was to accomplish this through finding methods and systems to increase knowledge encapsulation, innovation, and distribution. The IPT was tasked with three specific objectives (AFMC, 2002).

- Enhance the application of knowledge management opportunities to the warfighter support community (military, civilian, and contractor).
- Increase collaboration opportunities.
- Increase the quantity of pertinent knowledge management opportunities.

The goal of these current efforts is to offer direct access to the Air Force Deskbook subject matter as well as supply the means to develop the depth and breadth of information utilizing the CoP concept (Nguyen, 2002).

## **Conclusion**

This literature review provided a summary of information representing the major thinking regarding books that focus on CoPs. More specifically, it has provided background information on CoPs, presented some evolution theories for CoPs, and provided general information about past and present AF and AFMC CoP challenges and research. The literature covered in this chapter will be used as a basis for the research methodology addressed in Chapter 3.

### **III. Methodology**

#### **Introduction**

Chapters 1 and 2 discussed the current state of the AFMC/DRW CoP initiative and background information on various CoP evolution theories. This chapter will discuss the methodology used to examine the research questions. As such, this chapter includes a description of the research design, provides an in-depth explanation of the research questions, presents a discussion of the survey development, and details the statistical techniques that will be used to analyze the data.

#### **Research Design**

The general research design of this study is a survey. It is descriptive, cross-sectional, and based on a combination of quantitative and qualitative approaches. This particular methodological approach was chosen because it was determined to be necessary to collect quantitative as well as qualitative data from respondents in order to address the research questions. Also, due to limitations of time and resources, the survey method was considered the most practical over other methods of gathering data.

Instead of creating a new group, a descriptive design allows the collection of information on a research population that already exists (Fink, 1995). This research focused on one population for study and intended to make descriptive statements about the research questions so the research effort and design were well matched.

A cross-sectional survey design collects data at one point and time without follow-up (Fink, 1995). Cross-sectional designs are often used for standard survey-based

research like self-administered surveys. This matches well with the self-administered, web-based survey used in this research (Fink, 1995).

## **Research Questions**

As stated previously, this research will attempt to answer five research questions.

Again, these research questions are:

1. At what stage of evolution are individual AF/AFMC CoPs perceived to be?
2. What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?
3. For each CoP in a perceived stage of evolution, what is the extent of implementation of appropriate people, process, and technology capabilities?
4. In general, are perceptions about the individual CoP perceived stage of evolution and the choice of people, process, and technology capabilities consistent with Gongla and Rizutto's model?
5. What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?

The following paragraphs will explain the intent and focus of each question in the context of this particular research.

### **Research Question #1.**

The purpose of the first research question (*At what stage of evolution are individual AF/AFMC CoPs perceived to be?*) is to solicit perceptions of CoP managers as to the stage of evolution of the particular COP to which they belong. Their responses will be based on an assessment of COP stage evolution model developed by Gongla and Rizutto (Gongla and Rizutto, 2001). Identification of the perceived stage of evolution of each CoP is important in that it may give AF/AFMC a starting point from which to



address CoP improvements/advances. It will also give AF/AFMC and idea of the “status” of each CoP is as perceived by its own managers.

### **Research Question #2.**

The purpose of the second research question (*What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?*) is to allow an assessment of trends in evolution across the sample of CoPs. Furthermore, the results should help show how the various AF/AFMC CoPs are distributed across Gongla and Rizutto’s five stages of evolution. This identification of trends may help AF/AFMC decide where their efforts to improve efficiency and effectiveness should be concentrated.

### **Research Question #3.**

The purpose of the third research question (*For each CoP in a perceived stage of evolution, what is the extent of implementation of appropriate people, process, and technology capabilities?*) is to examine the perceived level of implementation of appropriate people, process, and technology capabilities (for that stage as indicated by Gongla and Rizutto). By assessing the extent of the implementation of each of these attributes/capabilities for each individual AF/AFMC CoP respondent, the researcher will be able to assess the “match” between “perceived” stage of evolution (according to Gongla and Rizutto) and the “actual” state of evolution. It will also provide a foundation for AF and AFMC efforts to improve and advance each CoP to its fullest potential.

### **Research Question #4.**

The purpose of the fourth research question (*In general, are perceptions about the individual CoP perceived stage of evolution and the choice of people, process, and technology capabilities consistent with Gongla and Rizutto’s model?*) is to illicit overall

trends of all sampled CoPs in reference to the extent of implementation of the identified people, processes, and technology capabilities. Identifying the trends of extent of implementation for the people behavior, process support, and enabling technology attributes/capabilities for each stage of evolution will give AF/AFMC an idea of their relative strengths and weaknesses in each of the capability areas. Armed with information AF/AFMC may be able to decide which capability areas are most lacking and need of attention. In addition, two open-ended questions in the survey will provide information to act as a crosscheck for any people behavior, process support, and enabling technology capabilities that may have not been previously identified or incorrectly identified as staged by respondents in the survey body.

#### **Research Question #5.**

The purpose of the fifth research question (*What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?*) is to illicit qualitative responses from CoP managers, through one open-ended question, as to what can be done to evolve CoPs to the more active stages and make them more effective.

#### **Survey Development**

The survey used in this research was developed based on previous research by Etienne Wenger, Richard McDermott, William Snyder, Patricia Gongla, and Christine Rizzuto. These authors are regarded as respected experts in the field of CoPs as are the models they propose in their literature. Gongla and Rizzuto's model concerning CoP evolution and the associated enabling of people, process, and technology capabilities was used as the foundation for this survey development because this model appears to be the

most practitioner-oriented and is touted as an evolutionary model and not a life-cycle model. The researcher felt this distinction was important because the life-cycle models assume that CoPs eventually lose utility and “die.” Instead, Gongla and Rizzuto’s model shows how CoPs can renovate themselves with each stage. This model best describes how CoPs are currently viewed by AF/AFMC; these CoPs transform and become more capable with each stage they go through, yet keep/carry on their identity (Gongla and Rizzuto, 2001).

### **Development of Survey Questions (Quantitative).**

The first nine questions of the survey addressed basic demographics. The survey asked for job position, time in that position, to which CoP the respondent belonged, and how long they belonged to that CoP, etc. After demographics, the second section of the survey addressed the “matching” attributes/capabilities for each stage as described by Gongla and Rizzuto. According to their model, each evolutionary stage has three component categories: people behaviors, process support, and enabling technologies. Survey questions were formed based on the attributes/capabilities that Gongla and Rizzuto posited for each stage by turning each attribute/capability into a question. On the next page, Table #6 from Chapter 2 shows an example of these three categories and the attributes/capabilities within those categories for Stage 1, The Potential Stage. These attributes/capabilities are the basis of survey questions associated with Stage 1. An example of forming a question would be taking “Individuals find one another and link up, from Table #6 and forming it into a question similar to “To what extent does your CoP promote individuals finding each other and linking up?” Tables #6 through #10, as seen in Chapter 2, were used in this manner to create the survey questions associated with the

remaining four stages. Although the survey questions that address the people behavior, process support, and enabling technology capabilities/attributes were based on a “match” to their respective stages, the survey was designed such that respondents could select any people behavior, process support, enabling technology capability/attribute (regardless of matching stage) if they felt it was being implemented in their CoP. An example of the entire research survey is located in Appendix A.

**Table #6. Potential Stage Enablers that Promote Connection (Stage 1)  
(Gongla and Rizzuto, 2001)**

<b>Stage 1</b>	<ul style="list-style-type: none"> <li>• Potential</li> </ul>
<b>Fundamental Function</b>	<ul style="list-style-type: none"> <li>• Connection</li> </ul>
<b>People Behavior</b>	<ul style="list-style-type: none"> <li>• Individuals find one another and link up</li> <li>• The organization may be unaware of or uninterested in the potential community</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• The organization may provide some support to locate and introduce individuals</li> </ul>
<b>Process Support</b>	<ul style="list-style-type: none"> <li>• Identifying potential community members</li> <li>• Locating potential community members</li> <li>• Facilitating bringing individuals together</li> </ul>
<b>Enabling Technology</b>	<ul style="list-style-type: none"> <li>• Electronic messaging systems: email, chat rooms, lists Phone calls and teleconferences</li> <li>• On-line forums</li> <li>• On-line directories</li> </ul>

### **Quantitative Question Measurement.**

For each of the people behavior, process support, or enabling technology attributes/capabilities, respondents were given a five point Likert scale to rate the extent of implementation of each. Respondents were asked to indicate the extent to which their CoP was implementing these attributes/capabilities on a scale from (1) being not at all to (5) being a very great extent. The measurement descriptors were taken from the Organizational Knowledge Practices Survey developed by Len Korot and George Tovstiga (2000). Chester McCall (2001) comments that Korot and Tovstiga used an identical Likert scale in previous research to “help build a better understanding of the knowledge culture, content, infrastructure, and processes” within an organization (Korot and Tovstiga, 2000). An example of a survey question for this CoP research, and the corresponding Likert scale used in the survey, is shown below in Figure #4. The wording of all questions on the survey was reviewed and revised to correspond with the people behavior, process support, and enabling technology attributes/capabilities found in Gongla and Rizutto’s model. Every attribute/capability from each stage is represented in the survey.

<b>The extent to which...</b>				
1. I participate in my CoP.				
<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure #4. Korot’s and Tovstiga’s Likert Scale (Korot and Tovstiga, 2000)**

### **Development of Survey Questions (Qualitative).**

The first two open-ended questions were designed to allow respondents to comment on any additional people behavior, process support, and enabling technology attributes/capabilities they thought were important but were not identified explicitly in the survey. The second open-ended question allowed the respondent to comment on people behavior, process support, and enabling technology attributes/capabilities that were identified in the survey but they felt were unimportant. These two questions together were designed to act as crosschecks for survey questions dealing with the people behaviors, process support, and enabling technology attributes/capabilities. Finally, a third qualitative question allowed respondents to identify/discuss any critical issues they thought were important in evolving CoPs to higher levels of maturity and effectiveness. This open-ended question provided data specifically for research question #5. These three open-ended questions were added in an effort to capture concepts that were not captured with the survey instrument. Also, because the survey instrument questions were based on the research of private sector CoPs and this research surveyed AF/AFMC CoPs, the researcher wanted to know if there were differences between Gongla and Rizutto's model and AF/AFMC CoP practitioners concerning what are important attributes/capabilities for evolving CoPs. The open-ended questions allowed for that input.

### **Sample Population**

The sample population targeted was the Knowledge Owners and Administrators of official AF and AFMC CoPs. These are the CoP managers referred to previously. Knowledge owners are the top management responsible for managing the CoP. CoP

administrators are the subordinate, more technical CoP management. Sometimes, in AF/AFMC CoPs, the knowledge owner and administrator are the same person. The survey was sent to all AF/AFMC CoP knowledge owners and administrators so the sample was the entire population of 241 people. Since the population was so small, sending the survey to the entire population was more appropriate than random sampling. Also, the literature states that when the information being researched is very specialized, the researcher must question the most knowledgeable expert in the area of research (Fowler, 1984). The CoP knowledge owners and administrators were surveyed because they are the AF/AFMC CoP experts.

### **Research Design Quality**

Surveys are a means for obtaining information on the range of subjects that a researcher is interested in (Fink, 1995). However, issues of quality must be addressed. This section discusses consistency, random error, measurement error, survey reliability, survey validity, accuracy, and validity checks.

#### **Survey Reliability.**

A consistent instrument is reliable (Fink, 1995). When collecting data, the researcher wants the survey to measure what it is supposed to measure. In addition, the researcher wants to minimize any error so the data more closely represents the truth. The following section discusses the steps taken to increase consistency and reliability in the data collection and survey instrument of this research.

Random error is unpredictable and unforeseen yet occurs in all research. Some measurement error is expected because no survey is perfect; however, steps were taken to minimize random error in this research. To minimize random error, which is usually

caused by sampling techniques, a larger, more representative sample size should be selected (Litwin, 1995). Due to the small size of the entire population and low cost of the survey method, this thesis research sampled the entire population of AF/AFMC CoP knowledge owners and administrators to minimize random error.

There are many types of survey instrument reliability including test-retest, intraserver, alternate-form, and internal consistency (Litwin, 1995). A test-retest reliability test was not feasible in the time space allowed for the research, so the research survey was sent to the entire population only once. An intraobserver reliability test was not performed due to these same time constraints. Also, due to the length of the survey (86 questions), an alternate form reliability test was not performed for fear of causing a poor response due to excessive length. These points will be discussed further in the limitations section of Chapter 5.

### **Survey Validity.**

Accuracy is vital for a valid survey (Fink, 1995). Validity is an evaluation of how the survey measures what it is supposed to measure. There are many types of validity including face, content, criterion, and construct validity (Litwin, 1995). The survey validity was addressed in two ways.

The survey instrument was first tested for face validity. This was accomplished by using a group of twenty-two AFIT graduate students with little or no knowledge of CoPs. These untrained judges were used to test face validity (Litwin, 1995). Since they were untrained in the subject matter, they were the best choice to judge if the survey items looked “ok” to them (Litwin, 1995). Face validity tests readability, ease of use, and how easy the survey is to complete. These untrained judges replied with comments on



how easy to read the survey was and how understandable the instructions were even though they had no knowledge of the subject.

The survey instrument was then tested for content validity. Content validity is a biased evaluation of how suitable the survey items appear to knowledgeable reviewers (Litwin, 1995). This second test involved five people who work in AFMC/DRW, are involved with the Knowledge Now team, work with CoPs and AFKM on a daily basis, and were very knowledgeable about the AF/AFMC CoP program. They were able to give advice about the wording and relevance of questions and survey instructions because they knew the subject matter and the nature of the respondents who would be participating in the survey. While content validity is merely an opinion of trained reviewers, it still presents a good basis for thorough review of a survey's validity (Litwin, 1995). These five knowledgeable respondents gave accolades to the survey design overall and made minimal comments for change. Finally, criterion validity was not accomplished due to lack of having an established and generally accepted survey instrument to compare with the survey used in this research. In addition, construct validity was also not accomplished due to time constraints.

## **Conduct of the Research**

### **Human Subjects Review.**

Before actual data collection could begin, approval was required from the Air Systems Command Human Subjects Review Board. Per Air Force Instruction 40-402, Air Force Human Subjects Review Program, this request for approval is necessary to survey AF personnel. The approval number given was FWR 2003-0013-E. A copy of

the Air Systems Command Human Subjects Review Board approval letter is in Appendix H.

#### **Air Force Survey Program Requirement.**

In addition to the Human Subjects Review process, the Air Force Personnel Command (AFPC) required approval of the survey instrument in accordance with Air Force Instruction 36-2601. A copy of the survey was sent to AFPC for their approval. A copy of this request is attached in Appendix I. The control number for this survey is USAF SCN 03-010. This survey control number is good through 1 Jun 03.

#### **Data Collection Planning.**

Data was collected on possible survey participants. Contact was made with Randy Adkins of AFMC/DRW to discuss how this research could help AFMC and what help/information AFMC could provide. After a course of action had been decided, Neil Reinsmoen, also from AFMC/DRW, provided email addresses of all 241 CoP knowledge owners and administrators. These 241 AF/AFMC CoP knowledge owners and administrators became the population to be surveyed for the research. After the survey was designed, a follow-up meeting with AFMC/DRW CoP officials was held and the survey examined. After this meeting, correspondence by email was the primary form of communication concerning the further execution of the research.

Data collection efforts were accomplished through a web-based survey. AFMC/DRW CoP officials sent an email, containing an online link to the web-based survey, to the 241 knowledge owners and administrators of AF and AFMC CoPs. It was posited that response rates would be higher if AFMC/DRW CoP officials sent the online link due to their involvement in the program and a preexisting relationship and rapport

with the population being surveyed. The invitation to take the survey was sent on 22 January 2003 and was available through 7 February 2003. Reminders to participate were sent to the entire population on 29 January 2003 and 5 February 2003 to increase respondent participation.

### **Data Collection Techniques.**

From the online survey, both the quantitative and qualitative survey data was collected into a database from which the data could be analyzed. As stated previously the survey was sent once with two reminders sent at one-week intervals. The quantitative data was then put into a computer spreadsheet so it could be sorted, manipulated, and analyzed in many different ways. The qualitative data, collected from the three open-ended questions, was placed into a Microsoft Word document for review and analysis.

### **Data Analysis Strategies.**

Now that data collection has been discussed, the following paragraphs will attempt to explain the data analysis strategies of each question in the context of this particular research. The data required basic descriptive statistics for analysis concentrating on the means.

### **Research Question #1.**

The first research question (*At what stage of evolution are individual AF/AFMC CoPs perceived to be?*) required taking the means of the respondent's answers to question 1 in section 2 of the survey (see Appendix B). If a CoP had multiple respondents, then the mean of all the answers from usable respondents was found and used as the overall "average" perceived stage of that CoP. Also, each answer to this question was rounded down to the nearest integer/stage. An example would be if a CoP

had multiple responses and the mean perceived stage equaled 3.9, then 3.9, rounded down to the nearest integer, would equal 3, which would equal stage 3. The researcher rounded down to the nearest integer with the theory that a CoP could not move into the next higher stage until all attributes/capabilities for the current stage were completed.

### **Research Question #2.**

Question #2 (*What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?*), was answered by finding the number of CoPs in each perceived stage of evolution, summing them, and dividing by the total number of CoPs represented in the survey which equaled 45. These results showed how many and what percent of all CoPs were in each perceived stage of evolution.

### **Research Question #3.**

Question #3 asked, (*For each CoP in a perceived stage of evolution, for individual AF/AFMC CoPs, what is the extent of implementation of appropriate people, process, and technology capabilities?*). This question required finding the means of the people behavior, process support, and enabling technology questions associated with the perceived stage for each individual CoP. An example of how the results were tabulated to answer this research question for each CoP is represented in Table 11, on the next page (see Appendix C for all results). For each perceived stage of evolution, the mean for each category of attributes (people behavior, process support, and enabling technology) was reported. These numbers will be referred to as “extent scores” from here on. These “extent scores” were figured by calculating the mean of each category of attributes individually, for each individual CoP. This procedure was done for all three categories of attributes in order to find the extent of implementation for each category in each CoP.

These mean “extent scores” tell the researcher the extent to which within (a particular perceived stage) each category of people behavior, process support, and enabling technology attributes/capabilities has been implemented. For example, a mean extent score of 2.33 for people behaviors would indicate that they had been implemented on average “to a little extent” (using the Likert scale in this research).

**Table #11. Example of Extent of Implementation Scores for CoPs Perceived to be in Stage 4 (Active Stage)**

<b>Appendix 3, Extent of Implementation Results for a Perceived Stage</b>			
<b>Perceived Stage 4. (Active)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
Air Force Pricing Assessment	1.43	2.80	3.80
Anti-Tamper Management	2.86	3.80	3.00
ASC Reconnaissance SPO	2.14	1.80	2.40
ASC Simulator Summit	1.86	1.60	2.00
Product Support	3.29	4.00	4.40
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.31</b>	<b>2.80</b>	<b>3.12</b>

#### **Research Question #4.**

The intent of research question #4, (*In general are perceptions about the individual CoP perceived stage of evolution and the choice of people, process, and technology capabilities consistent with Gongla and Rizutto’s model?*) was to compare what stages the CoP managers perceived their CoP to be in (results from research question #1) with what choices they made in answering the extent of implementation questions of people behavior, process support, and enabling technology capabilities for

each stage (results in Appendix C). This comparison was accomplished by taking the mean of all the individual CoP extent scores of each category individually (results of question #3). This result is the overall extent score of that category in the perceived stage. Finally, two open-ended questions, addressing the people behavior, process support, and enabling technology content of the survey, were analyzed and provided information to act as a crosscheck for any people behavior, process support, and enabling technology attributes/capabilities that may have, or have not, been previously identified in the survey body. These two questions allowed the respondent to express their opinions.

#### **Research Question #5.**

The fifth research question (*What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?*) was addressed using content analysis to analyze and categorize the answers to the third open-ended question on the survey. This was accomplished by using a word document with all usable responses on it. The responses were cut and pasted into groups of similarity. Any trends or commonalities were noted and presented.

#### **Conclusion**

This chapter discussed the methodology for examination of the research questions. As such, the chapter included a description of the research design, offered in-depth explanation of the research questions, provided a discussion of the survey instrument development, and discussed the statistical techniques that will be used to analyze the data. The results of the research and analysis will be presented in Chapter 4.

Chapter 5 will discuss the implications and limitations of the research and will propose future research possibilities.

## **IV. Findings & Analysis**

### **Overview**

This chapter presents the findings of the survey described in Chapter 3. The first section outlines the response rates and demographics associated with the survey. The second section outlines the results and analysis of the data collected. The final section discusses each research question in terms of the results and analysis.

### **Response Rate**

The total number of usable survey responses was 73. The survey was available on-line from 22 January 2003 to 7 February 2003 and requests for participants to take the survey were made through an email. This email request was sent to the entire population of 241 AF/AFMC CoP knowledge owners and administrators of which only five email addresses were rejected. This resulted in a 97.9% delivery rate. During the time the survey was on-line, 125 responses were received. This was 51.9% of the total population. From the 125 responses received, some were removed because respondents had not filled out the entire survey (excluding the three open-ended/qualitative questions). After the review of the data was complete, 73 usable survey responses remained. This resulted in a 58.4% total population, which was representative of 30.3% of the total surveyed population. From these 73 usable responses, 45 different CoPs were represented.



## **Summary of Results**

This section presents the results and findings for each research question proposed in Chapter 1. First, a report of the demographics of the survey participants will be discussed. Each research question will also be restated and the related data findings and analysis will be reported.

### **Demographics.**

The first nine questions of the survey addressed basic demographics. A list of the 45 different CoPs, from which responses were received, is located in Appendix D. The demographics portion of the survey asked for job position, time in that position, to which CoP the respondent belonged, and how long respondents had belonged to that CoP, etc. A summary of demographic information collected is shown on the next page in Table #12.

Table #12 shows that respondents (a total of 76.6%) reported themselves to be CoP administrators (34.2%), primary knowledge owners (26.0%), or alternate knowledge owners (16.4%). AFMC/DRW considered every email addressee the survey was sent to, to be a member of one of these three categories. However, 20.5% of the respondents labeled themselves as “other”. This indicates the possibility that some knowledge owners and administrators may not be aware that they are such. Also, when asked if they had administrators working under them, 35.6% replied with “not applicable” again indicating that some respondents were unsure. In addition, the average time the respondents indicated that they had held these positions was 7.1 months. Comparing this to the average membership length of 7.0 months indicates that these respondents have been CoP managers approximately as long as they have been members. Also, Table #12 shows that

only 23.3% of the respondents were involved in more than one CoP and the average length of existence for a CoP was 8.4 months. It is also important to note membership size. 10.9% of the respondents reported the total number of CoP members to be over 75, 13.7% reported 41 to 75 CoP members, 9.6% reported 21 to 40 members, 28.8% reported 11 to 22 members, and 12.3% reported less than ten members.

**Table #12. Summary of Demographics across All Responding CoPs**

Demographic Question		Statistics	
	Number	Percentage	
Are you a primary knowledge owner, alternate knowledge owner, champion, or other?	25 Administrators	34.2%	
	19 Primary Knowledge Owners	26.0%	
	12 Alternate Knowledge Owners	16.4%	
	2 Champions	2.7%	
	15 Other	20.5%	
How long have you held this position?	Average of 7.1 Months		
Do you have administrators working under you?	23 Yes	31.5%	
	24 No	32.9%	
	26 Not Applicable	35.6%	
Are you active in more than 1 CoP as an administrator?	17 yes	23.3%	
	56 no	76.7%	
How long has your CoP been in existence?	Average of 8.4 Months		
How long have you been a member?	Average of 7.0 Months		
What is the total number of members in your CoP?	<10	9	12.3%
	11-20	21	28.8%
	21-40	7	9.6%
	41-75	10	13.7%
	>75	8	10.9%
	Don't Know	18	24.7%

### **Research Question #1.**

Research question one asked, “*At what stage of evolution are individual AF/AFMC CoPs perceived to be?*” To answer the question, the researcher assessed the portion of the survey which asked respondents to indicate their perceptions about what evolutionary stage, according to Gongla and Rizutto’s five-stage model, they thought their CoP was in. If multiple responses for the same CoP were received, the mean was calculated and rounded down to the nearest whole number, and reported as the perceived stage for that specific CoP. A perceived stage was reported for each individual CoP that was represented by usable responses. The results of this question, for each individual CoP, can be found in Appendix B.

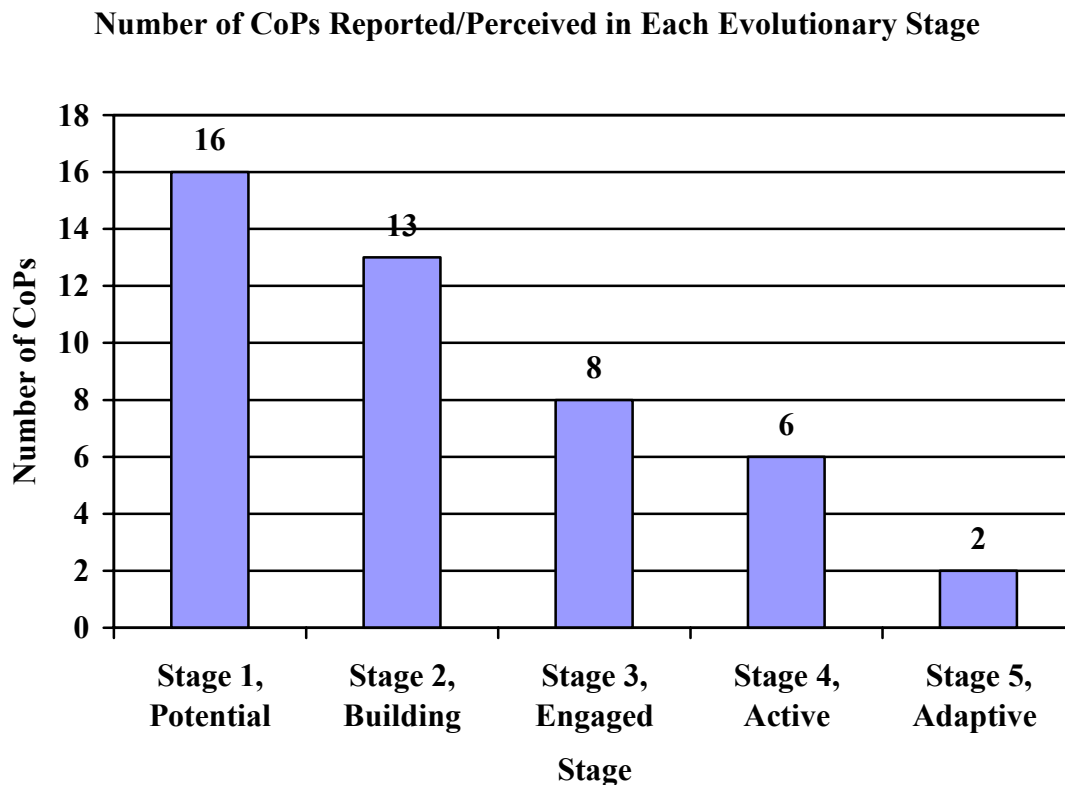
### **Research Question 2.**

Research question #2 asked, “*What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?*” The answer to this question was found by grouping CoPs by like perceived stages of evolution. The percentage of CoPs in each perceived stage was calculated by summing all those in each stage and dividing by the total number of CoPs represented in the survey which equaled 45. These results show how many and the equivalent percent of CoPs were reported to be in each stage. These results are shown below in Table #13.

**Table #13. Total and Percentage of AF/AFMC CoPs Perceived in Each Stage**

<b>Perceived Stage</b>	<b>Total CoPs in the Stage</b>	<b>% of CoPs in the Stage</b>
<b>Stage 1, Potential</b>	16	35.6%
<b>Stage 2, Building</b>	13	28.9%
<b>Stage 3, Engaged</b>	8	17.8%
<b>Stage 4, Active</b>	6	13.3%
<b>Stage 5, Adaptive</b>	2	4.4%

This information gives some idea of how AF/AFMC CoPs are spread across Gongla and Rizutto's five stage evolutionary scale. According to the data, over 64.4 % of the respondents perceived their CoP to be in the first two stages, potential and building. Figure #5, below, gives a visual representation of this data.



**Figure #5. Number of CoPs Perceived per Stage**

Additionally, as identified previously in Appendix B, the mean of perceived stages across all CoPs was 2.36. Rounded down to the nearest stage this equals stage 2. This indicates that, on average, AF/AFMC CoP managers perceived their CoP to be in stage 2, meaning that AF/AFMC CoP managers perceived themselves on average to be in “stage 2 – building”.

### Research Question #3.

Research question #3 asked “*For each CoP in a perceived stage of evolution, what is the extent of implementation of appropriate people, process, and technology capabilities?*” The answer to this question was found by first grouping AF/AFMC CoPs together that had been reported, by management, to be in the same evolutionary stages. Then, the mean “extent” score of each people behavior, process support, and enabling technology capability, within each stage the CoP managers perceived, was found for each individual CoP. The means/results correspond with the Likert scale on the survey (1 = not at all, 2 = to little extent, 3 = to moderate extent, 4 = to a great extent, 5 = to a very great extent). The results for each individual CoP are found in Appendix C. Table #14 shows an example, from Appendix C, of mean extent scores for stage 4.

**Table #14. Example of Mean Extent Scores for Each Category for CoPs in Stage 4**

<b>Perceived Stage 4. (Active)</b>	<b>Extent Scores for people behavior, process support, and enabling technology attributes/capabilities</b>		
	<b>pb = people behavior</b>	<b>ps = process support</b>	<b>et = enabling technology</b>
<b>CoP Name</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
Air Force Pricing Assessment	1.43	2.80	3.80
Anti-Tamper Management	2.86	3.80	3.00
ASC Reconnaissance SPO	2.14	1.80	2.40
ASC Simulator Summit	1.86	1.60	2.00
Acquisition Policy Development & Compliance	3.00	2.60	2.40
Product Support	3.29	4.00	4.40
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.43</b>	<b>2.77</b>	<b>3.00</b>

#### **Research Question 4.**

Research question #4 asks, “In general, *are perceptions about the individual CoP perceived stage of evolution and the choices of people, process, and technology capabilities, consistent with Gongla and Rizutto’s model?*” This question seeks to compare what stages the CoP managers perceived their CoP to be in (results from research question #1), with what choices they made answering the extent of implementation questions of people behavior, process support, and enabling technology capabilities for each stage. The purpose of this research question was to determine if CoP managers are implementing any people behavior, process support, and or enabling technology capabilities, according to Gongla and Rizutto’s model, from stages outside their perceived stage. The extent scores for each stage were calculated by taking the mean of all the responses for each question associated with that stage. The responses to the survey questions indicate if CoP managers are implementing attributes/capabilities from other stages by reporting extent scores of 2 or higher for any attributes/capabilities of stages other than the one they identified being in (outside stage). This is because theoretically if a CoP is truly in a particular stage, every other question associated with a higher stage should have an extent score of 1 (Not at all”). Appendix E shows all these results. Table #15, on the next page, is an excerpt from Appendix E. By comparing the overall mean extent scores for each CoP (or each stage) it was determined if a CoP was implementing specific attributes/capabilities from stages other than the perceived stage. If the extent scores of a CoP are rounded down to the nearest integer/stage, and more than one stage shows an implementation score of 2 or higher, then the CoP is implementing attributes/capabilities of stages outside the one they identified themselves as being in. If

a CoP reported an extent score of 1 (Not at all) for all five evolutionary stages, the question of implementing attributes/capabilities from outside stages was NA (not applicable).

**Table #15. Example of Analysis of Capability Implementation in All Five Stages**

<b>CoP Respondent belongs to</b>	<b>Stage 1 Extent Score</b>	<b>Stage 2 Extent Score</b>	<b>Stage 3 Extent Score</b>	<b>Stage 4 Extent Score</b>	<b>Stage 5 Extent Score</b>	<b>Perceived Stage</b>	<b>Implementing Capabilities from other stages (Y/N)</b>
Ramstein Knowledge management	3.00	3.13	3.10	3.12	2.60	1	Y
WSMS	2.11	2.47	2.43	2.00	1.40	1	Y
607th Weather Squadron	2.50	1.87	1.74	1.65	1.45	2	N
Financial Management	1.56	1.27	1.41	1.24	1.20	2	NA
IG	1.94	1.73	1.78	1.47	1.20	2	NA
ACC Armament	1.61	2.00	2.17	2.12	1.85	2	Y

The overall analysis for research question #4 showed that of the 45 respondents, 91.1 % reported implementing attributes/capabilities from stages other than the stage they identified themselves as being in. This indicates that most AF/AFMC CoP managers are implementing attributes/capabilities from multiple evolutionary stages according to Gongla and Rizutto’s model. However, no respondents indicated they were not implementing attributes/capabilities from stages other than the perceived stage and 8.9% were not applicable (NA) because their extent score for all five stages was 1, “not at all”, meaning they were not implementing anything for any stage. Table #16, on the next page, summarizes these results.

**Table #16. Summary of CoPs that Reported Implementing  
Attributes from Other Stages**

CoP	Perceived Stage	Implementing Capabilities from other stages	
ACC Special Weapons	1	NA	
ACE Community of Practice	1	Y	
AFMC Portal	1	NA	
AFSPC Space Training	1	NA	
Command Structure	1	Y	
Contracting	1	Y	
DR IMAs	1	Y	
F-15 SPO CoP	1	Y	
Mentoring	1	Y	
MIS CoP	1	Y	
Ramstein Application Development Group	1	Y	
Ramstein Knowledge management	1	Y	
Reliability & Maintainability	1	Y	
USAFE Armament	1	Y	
Weapon System Management Support	1	Y	
Air Force Spacecraft Control Network	1	Y	
Acquisition Center of Excellence	2	Y	
AMATS	2	Y	
Cost Estimating and Analysis	2	Y	
E-Learning for KM	2	Y	
Financial Management	2	Y	
Software Management	2	Y	
TechKnowlegy	2	Y	
Cost	2	Y	
607th Weather Squadron	2	Y	
ACC Armament	2	Y	
FMS PRICING	2	Y	
Inspector General	2	NA	
Acquisition Policy Development & AFKM	2	Y	
AFMC Cost Advocates Group	3	Y	
Comprehensive Air Force Technical Order	3	Y	
SAF/FMC O&S Working Group	3	Y	
USAF Deficiency Reporting and Investigating	3	Y	
Enterprise Leadership	3	Y	
Intelligence in Force Modernization	3	Y	
Software Modification Management	3	Y	
AFMC munitions	3	Y	
Air Force Pricing Assessment	4	Y	
Anti-Tamper Management	4	Y	
ASC Reconnaissance SPO	4	Y	
ASC Simulator Summit	4	Y	
Product Support	4	Y	
AFMC EW Roadmap	5	Y	
FM-KM Task Force	5	Y	
	<b>Mean of</b>	<b># Of Yes/No/Not Applicable</b>	
	<b>2</b>	<b>41 Yes</b>	<b>91.1%</b>
		<b>0 No</b>	<b>0.0%</b>
		<b>4 NA</b>	<b>8.9%</b>



Another consideration in answering research question #4, was the fact that as a CoP progresses through the evolutionary stages, it is assumed that it will probably be implementing people behavior, process support, and enabling technology attributes/capabilities of the previous stages in addition to the stage it is in. Many respondents perceived their CoP to be in a more advanced or less advanced stage than was indicated by the separate people behavior, process support, and enabling technology implementation responses. Appendix G shows which CoPs perceive their CoP to be in a more advanced, less advanced or same stage of maturity as compared to their responses to the separate people behavior, process support, and enabling technology implementation. Overall, 31.1% of respondents indicated a “perceived” stage more advanced than that indicated by the corresponding people behavior, process support, and enabling technology implementation responses; 40% indicated a “perceived” stage less advanced than that indicated by corresponding people behavior, process support, and enabling technology implementation responses; and 28.9% showed a match between perceived stage and corresponding people behavior, process support, and enabling technology implementation responses.

### **Variability of Responses.**

Analysis of the variability of responses was measured by examining the standard deviations, associated with the analysis of capability implementation in all five stages. Analysis reveals a trend among respondents. The standard deviations cover a wide spread of numbers with many being larger than 1. This could mean one of two things; the survey is unsatisfactory, or respondents are choosing varied responses on the Likert scale across the entire survey. Through analysis of the raw data it was shown that

respondents vary greatly in their “extent of implementation” choices within all stages and categories. This lead to the wide spectrum of standard deviations for the extent scores.

Table #17 is an example of some standard deviations found in Appendix E.

**Table #17. Example of Appendix E, Standard Deviations for the Analysis of Capability Implementation in All Five Stages**

CoP Respondent belongs to	Stage 1 Std Dev for extent score means	Stage 2 Std Dev for extent score means	Stage 3 Std Dev for extent score means	Stage 4 Std Dev for extent score means	Stage 5 Std Dev for extent score means	Perceived Stage	Implemented Capabilities from other stages
ACC Special Weapons	0.73	0.39	0.36	0.00	0.00	1.00	NA
ACE CoP	1.00	0.50	0.78	0.80	0.00	1.00	Y
AFMC Portal	0.60	0.75	0.51	0.87	0.63	1.00	NA
AFSPC Space Training	0.33	0.00	0.00	0.00	0.00	1.00	NA
Command Structure	1.12	0.95	0.68	0.83	1.06	1.00	Y
Contracting	0.73	0.91	0.65	0.33	1.16	1.00	Y
DR IMAs	0.71	0.39	0.75	0.79	0.00	1.00	Y
F-15 SPO CoP	0.55	0.21	0.30	0.39	0.00	1.00	Y
Mentoring	0.53	1.18	1.53	1.41	0.63	1.00	Y
MIS CoP	0.71	0.55	0.51	0.51	0.00	1.00	Y
Ramstein Application Development Group	0.97	0.99	0.90	0.83	0.97	1.00	Y
607th Weather Squadron	0.86	0.75	0.63	0.73	0.89	2.00	N

### **Open-Ended Questions.**

Two open-ended questions, in section 4 of the research survey, were also analyzed and provided information to act as a crosscheck for any people behavior, process support, and enabling technology capabilities that may have not been previously identified in the survey body.

Open-ended question #1 asked *“In the space provided below, please tell us if there are any people, process, or technology capabilities that were not identified on this survey but you feel are important?”*. Below are the usable responses, in no particular order, to open-ended question #1.

- “Training of owners and users”
- “Work flow management”
- “Teamwork is very important”
- “Approval processes”

Open-ended question #2 asked, *“In the space provided below, please tell us if there are any people, process, or technology capabilities that you feel are unimportant but were identified?”* Below are the usable responses that were received.

- “Recruiting new members to the group through the CoP. I identify members who are allowed to join”
- “Portals make little impact on me or end customers”

These two open-ended questions induced short concise answers from the respondents. Due to lack of context accompanying the responses, it was difficult to analyze the respondents’ exact intent. At face value, the responses resemble similar people behaviors, process support, and enabling technology attribute questions covered in the survey. Comments regarding training of owners and users and teamwork are two examples of subjects that were covered in the survey but were also added again by respondents.

#### **Research Question 5.**

Research question 5 asked, *“What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?”* This

question was answered by the third open-ended question in section 4 of the research survey.

Open-ended question #3 asked, (*“What do you think are the critical issues in evolving your CoP to higher levels of maturity and effectiveness?”*). Table #18, on the next page, summarizes the usable responses. These responses were reviewed by the researcher for repetitive, synonymous comments and then categorized according to subject. The categories of responses that surfaced were: upper management buy-in, member/participant commitment, pursuit of an objective, and training. If a response had no synonymous match, it was placed into the “other” category.

**Table #18. Identified Critical Issues in Evolving CoPs**

<p style="text-align: center;"><b>Category: Upper Management Buy-In</b></p> <p><b>Responses</b></p> <ul style="list-style-type: none"> <li>• “Obtaining high level management support”</li> <li>• “Senior Level Personnel with knowledge of the organization”</li> <li>• “Priority in making this effort useful to the organization and internal/external stakeholders”</li> <li>• “Needs to be incorporated into organizational policy”</li> <li>• “Greater levels of awareness of the existence of the CoP”</li> <li>• “Senior (management) buy-in”</li> </ul>	
<p style="text-align: center;"><b>Category: Member Participation/Commitment</b></p> <p><b>Responses</b></p> <ul style="list-style-type: none"> <li>• “Higher level of commitment in members”</li> <li>• “Members active participation”</li> <li>• “Having the CoP actually be a forum more actively used by its members.”</li> <li>• “Communication within the members and the spread of knowledge and capabilities”</li> <li>• “More feedback and interaction among members is needed”</li> <li>• “Participant buy-in”</li> </ul>	
<p style="text-align: center;"><b>Category: Pursuit of an Objective</b></p> <p><b>Responses</b></p> <ul style="list-style-type: none"> <li>• “My CoP will evolve when there is a project or issue that the group needs to tackle”</li> <li>• “A real requirement”</li> <li>• “Group objectives and subject matter content are issues that will effect CoP maturity and effectiveness”</li> <li>• Exploitation of the CoPs capabilities</li> <li>• “The CoP has a specific product to deliver and would then dissolve”</li> </ul>	
<p style="text-align: center;"><b>Category: Training</b></p> <p><b>Responses</b></p> <ul style="list-style-type: none"> <li>• “Training of owners and users”</li> <li>• “Growth and training of the community towards collaborative processes”</li> <li>• “Training. Not enough time in the day to learn and maximize the tools”</li> </ul>	
<p style="text-align: center;"><b>Category: Other</b></p> <p><b>Responses</b></p> <ul style="list-style-type: none"> <li>• Ease of use/user friendly environment</li> <li>• “Awareness raising”</li> <li>• “A "champion" who won't be discouraged by a seeming lack of commitment among members -- someone who will keep driving even if no one seems to be following”</li> <li>• “Better exchange of information across satellite control communities”</li> <li>• “Just getting people to integrate it into their day-to-day practices”</li> </ul>	

All of these qualitative responses are important because they tell us directly what the respondent are thinking.

## Conclusion

This chapter analyzed the data collected for this study and briefly presented the findings of the survey described in Chapter 3. The first section outlined the response rates and demographics associated with the survey. The second section outlined the results and analysis of the data collected. The final section discussed each research question in terms of the results and analysis.

In Chapter 5, Conclusions and Recommendations, the implications for AFMC, the Air Force, and for researchers will be discussed. Chapter 5 will also discuss the limitations of this research and the possibilities for future research.

## **V. Conclusions and Recommendations**

### **Overview**

In this chapter, a discussion of the research questions will be presented. This chapter will also discuss the implications for AFMC and the Air Force. Furthermore, this chapter will discuss the limitations of this research and the possibilities of future research.

### **Discussion of Results**

The demographics indicated that AF/AFMC has CoPs in the early stages of evolution and inexperienced CoP managers. Also, the CoPs themselves are growing very quickly. These three phenomenon support what the data for extent scores reported. Research question 1 indicated that CoP managers perceive their CoPs to be in the early stages of evolution. The demographics indicated this as well by reporting an average CoP age of 8.4 months. Similarly, research question 2 was also supported by the average CoP age of 8.4 months. Data associated with research question 2 indicated a majority of AF/AFMC CoPs were perceived to be in the first two evolutionary stages (potential and building) by their managers. Research question 3 indicated how CoP managers were implementing people behavior, process support, and enabling technology attributes/capabilities to a low extent across all CoPs. The demographics supported this by reporting how the average CoP manager has held that position for only 7.1 months and may lack experience.

#### **Research Question #1.**

Research question #1 (*“At what stage of evolution are individual AF/AFMC CoPs perceived to be?”*) was specifically asked in the survey. Results for research question #1

are in Appendix B. The results of this question gave the researcher a baseline of where the CoP managers perceived themselves. Results of this research question showed that most AF/AFMC CoPs are perceived to be in the early stages of evolution and just beginning to develop and grow.

### **Research Question #2.**

Research question #2 (*“What are the trends in evolution across all sampled AF/AFMC CoPs as they are perceived?”*) showed that most of the AF CoPs (64.4%) are perceived to be in the first two stages, the “Potential” and “Building” stages, according to Gongla and Rizutto’s evolutionary model. These are the stages where a community is forming, eventually defines itself, and formalizes its operating principles (Gongla and Rizutto, 2001). Also, the average extent score for all responding CoP’s people behavior, process support, and enabling technology attributes/capabilities, equaled 2 on the Likert scale in the survey which indicated an average implementation of “to a little extent”. These results showed that, on average, the respondents, perceived the implementation of particular people behavior, process support, and enabling technology attributes/capabilities was at the earliest stages. Likewise, only 4.4% of the respondents perceived their CoP to be in stage 5, the “Adaptive” stage. The high number of AF/AFMC CoP managers perceiving their CoPs to be in the early stages of evolution makes sense since the average age length of these CoPs is 8.4 months and the average membership length is 7.0 months. Most of these CoPs appear to be really just getting started.



### **Research Question #3.**

Research question #3 (*“For each CoP in a perceived stage of evolution, what is the extent of implementation of people, process, and technology capabilities?”*) found that the implementation of matching people behaviors, process support, and enabling technology attributes/capabilities was very low for the stages of evolution reported. When the overall mean extent scores for each group of CoPs that perceived a like stage, were averaged together, an overall extent score of 2.48 resulted. This equals 2, “To a little extent”, on the Likert scale on the survey. This means that, on average, CoP managers reported implementing the people behaviors, process support, and enabling technology attributes/capabilities “to a little extent” in their perceived stages. This indicates that implementation of matching people behaviors, process support, and enabling technology attributes/capabilities is presently lacking. For example, if discussing results of the extent of implementation of people behaviors, process support, and enabling technology attributes/capabilities for stage 2, what we could conclude includes the following:

- There is a lack of identification, location, and congregation, of potential community members
- Core CoP members are not communicating
- Owner organizations are unaware or uninterested in the CoP
- There is a lack of use of online/technological tools and applications

### **Research Question #4.**

Research question #4 (*“In general, are perceptions about the individual CoP perceived stage of evolution and the choice of people, process, and technology capabilities consistent with Gongla and Rizutto’s model?”*) found that AF/AFMC CoP

managers are implementing attributes/capabilities from multiple stages. By comparing the mean extent scores of every stage for each individual CoP (see Appendix E) we saw that a vast majority (97.8%) of AF/AFMC CoP managers were implementing people behaviors, process support, and enabling technology attributes/capabilities from outside stages, or not implementing anything at all.

91.1 % of the 45 respondents reported implementing attributes/capabilities from stages more advanced or less advanced than the stage they identified themselves as being in. According to Gongla and Rizutto's model, this suggests that the majority of AF/AFMC CoP knowledge owners and administrators are implementing attributes/capabilities from several evolutionary stages. This could possibly be due to the lack of experience and average time CoP managers have held their position. 8.9% of the respondents were not applicable (NA). This was because their extent scores for all five stages was 1, "not at all", meaning they were not implementing anything for any stage. This could possibly be due to these particular CoPs being in the very early first (potential) stage, of development. Interestingly, no respondents indicated their CoP was not implementing attributes/capabilities from outside their perceived stage of evolution. These findings indicate that AF/AFMC CoP managers, and what they perceive, are not consistent with Gongla and Rizutto's model.

Section 4 of the research survey contained two open-ended questions that were also analyzed. These two questions provided information to act as a crosscheck for any people behavior, process support, and enabling technology capabilities that may have or have not been previously identified in the survey body.

Open-ended question #1 asked *“In the space provided below, please tell us if there are any People, Process, or Technology capabilities that were not identified on this survey but you feel are important?”* Below are the usable responses, in no particular order, to open-ended question #1.

- “Training of owners and users”
- “Work flow management”
- “Teamwork is very important”
- “Approval processes”

Open-ended question #2 asked, *“In the space provided below, please tell us if there are any People, Process, or Technology capabilities that you feel are unimportant but were identified?”* Below are the usable responses that actually attempted to answer open-ended question 2.

- “Recruiting new members to the group through the CoP. I identify members who are allowed to join”
- “Portals make little impact on me or end customers”

To reiterate, these two open-ended questions produced short concise answers from the respondents that lacked context and was difficult to analyze what the respondents were thinking. Overall, the responses were not very useful. Analyzing the responses only at face value, we see the responses resemble similar subjects covered in the survey. Training of owners and users and teamwork are two examples of subjects that were covered in the survey even if the survey did not use the exact same wording. Perhaps the respondents used these open-ended questions as a sounding board to reiterate what they thought was and was not important regardless if it was covered by the survey instrument or not.

### **Research Question #5.**

Research question #5 (*“What do AF/AFMC CoP managers perceive as the critical issues in evolving CoPs to higher levels of maturity and effectiveness?”*) was answered by 30 usable responses provided through open-ended question #3 (*“What do you think are the critical issues in evolving your CoP to higher levels of maturity and effectiveness?”*). Open-ended question #3 induced many similar responses from different respondents. This repetition of responses indicates that CoP managers agree in the importance of the responses. Looking at Table #17 in Chapter 4, we see the comments made by the respondents. Looking at the categories that surfaced, the top four things respondents felt were critical can be observed. The categories of upper management buy-in, member/participant commitment, pursuit of an objective, and training were the four responses repeated most, and therefore considered the most critical by AF/AFMC CoP managers. The importance of gaining high level management support and making the organization aware of the CoP, as well as intertwining the CoP into organizational policy, was mentioned the most. Having the CoP act as a forum for members to use, contribute to, and participate in was also mentioned extensively. Projects and “real requirements” were also reported as necessary for CoP evolution. The need for training was also considered important.

### **Implications for the Air Force and AFMC**

As shown by the data, the majority of AF/AFMC CoPs are, overall, in the early stages of evolution. At the same time there seems to be a growing interest in the AF/AFMC CoP program and its benefits even though much is still being organized and sorted out. There also seems to be a wide spectrum of perceptions among CoP managers

pertaining to what evolutionary stages their CoPs are in. Furthermore, CoP managers are reporting a low extent of implementation of the people behaviors, process support, and enabling technology attributes/capabilities associated with their perceived stage. What this means for the CoPs “hosted” by AFMC/DRW is that people/users want to support and see these CoPs used to their fullest potential. However, the data suggests that there is much work to be done.

### **Limitations**

In almost every research study, there are certain aspects that increase the uncertainty and diminish the reliability of the results. Perhaps the most limiting factor was the survey itself. As mentioned in Chapter 3, a test-retest reliability test was not feasible in the time space allowed for the research. Also, this was a self-reporting survey. The respondents could have been biased in regards to themselves.

Another limitation could possibly have been the length of the survey (86 questions). This length was the reason an alternate form reliability test was not performed. It was decided not to ask the same question in multiple ways because it would have lengthened the survey and caused a poorer response rate. Also, respondents may have given up and not wanted to spend that much time to answer survey questions.

Throughout this research the researcher made numerous judgment calls about how to assess the data. This possibility of human error could be a limitation. How to group the data, sort the data, calculate the data, and deciding which calculations to compare, are all judgment calls made by the researcher. When dealing with the qualitative data, even more judgment had to be used. The researcher had to judge what context the

respondent's qualitative answers were in so the data could be grouped into categories and reported. These qualitative answers were often short and without explanation so the researcher's judgment played a big part.

### **Recommendations for Future Research**

There is a lot of research open for study in this subject. It is impossible for this research to cover all aspects of CoP evolution within the Air Force or otherwise. One idea for future research would be to administer the same survey to the same population again in one year's time. It would be valuable to see if the CoPs continue to evolve and it would also be beneficial for AFMC/DRW to see if improvements in people behaviors, process support, and enabling technology implementation were being made.

This research found it difficult to extract highly valuable qualitative answers from the respondents. This fact, combined with the judgment calls that had to be made by the researcher (with respect to context concerning the qualitative open-ended questions) leads to another idea for future research. Another idea would be to administer the same survey but in addition to each quantitative question there would be a second question, with the same Likert scale, asking how important the particular attribute/capability is to the respondent. This second question would give the researcher a definite answer about how important each attribute/capability is to the respondent. This would quantify and eliminate the need for open-ended question #3 (*"What do you think are the critical issues in evolving your CoP to higher levels of maturity and effectiveness?"*) By quantifying this question, the limitation of researcher error could be reduced as compared to having the researcher make judgment calls about the context in which the respondent is

answering open-ended question #3. Also, these quantified answers could be compared to the qualitative results found in this research to see if there are any similarities.

Another research possibility would be to survey all AF/AFMC CoP managers again, a year later, and compare demographics. The researcher could research if the CoPs have grown, and if so, has the size of their CoP management grown with them (more Administrators). Another question could ask if CoP management were any more experienced. This could be valuable research because so much of the CoPs success depends on its leadership.

## **Conclusion**

A variety of theories state that CoPs “evolve” or “mature” through various stages over time. Such theories posit that each stage is characterized by different people, processes, and technology attributes/capabilities which ultimately necessitate differing strategies for achieving effectiveness (Gongla and Rizzuto, 2001). A primary goal of AFMC/DRW, AFMC Electronic Learning (eLearning) Knowledge Management Integrated Project Team, and the office of the Air Force Chief Information Officer is to increase CoP participation and effectiveness. The purpose of this research was to help AFCIO and AFMC gain information to use as a foundation for increasing the use, effectiveness and efficiency of existing CoPs.

Overall, this research concluded that, on average, AF/AFMC CoPs are in the very early stages of evolution, and the extent of implementation for stage-specific attributes/capabilities was found to be minimal. The implications of this research show, given the relatively “undeveloped nature” of many of the CoPs, there are a wide range of

actions that can be taken to improve the efficiency and effectiveness of existing CoPs. These actions include increasing leadership involvement and support, increasing membership education and training, defining more clearly the purpose/objectives of each CoP, and implementing easier technology tools for navigating the COP collaborative electronic workspace. CoPs, for the most part, are not yet being incorporated in the way organizations are doing everyday business. This information may help AF/AFMC in accomplishing their goals.



## Appendix A.

USAF SCN 03-010

### **Air Force/AFMC Community of Practice Survey**

#### **Introduction**

This survey is designed to help determine what Air Force and AFMC Community of Practice (CoP) Knowledge Owners and Administrators consider as key people, process, and technology, capabilities for their respective CoPs. By participating in this survey, you will be helping the Air Force and AFMC better support you and your CoP. We realize you may participate and/or be a member of more than one CoP. Please fill out this survey, with respect to the CoP you are **MOST** involved with, by selecting the appropriate responses below. If you feel this survey is unnecessary please contact Captain Jason May directly at [jason.may@afit.edu](mailto:jason.may@afit.edu). If you encountered any problems with the online survey please contact.....

#### **Section 1.**

##### **Demographics**

Please answer the following demographic questions.

1. Email (Optional, for tracking purposes only) (Type In)
2. To which CoP do you belong (if you belong to multiple CoPs, pick the CoP you are MOST involved with)? (Type In)

3. Are you a Primary Knowledge Owner, an Alternate Knowledge Owner, an Administrator, a champion of a Community of Practice, or other? (Drop down)  
Primary  
Alternate  
Administrator  
Champion  
Other
4. How long have you held this position? (Months) (Drop Down)  
1-48+
5. As a Knowledge Owner do you have Administrators working with/under you? (Drop Down)  
Yes  
No  
Not Applicable
6. Are you active as an Administrator or Knowledge Owner in more than one CoP? (y/n)
7. How long has your CoP been in existence? (Months) (Drop Down)  
1-48+  
Don't Know
8. How many members total in your CoP? (Drop Down)  
(Ranges)  
<10  
11-20  
21-40  
41-75  
>75  
Don't Know
9. How long have you been a member in your CoP? (Months) (Drop Down)  
1-48+

## Section 2.

### CoP Stages of Evolution

Research has shown that CoPs evolve through various stages. We would like to know what stage best describes your CoP as it currently exists. Please review the table below and choose a stage based on your personal experience within your CoP.

1. Please review the stages below and select the one stage (based on the Fundamental Function, Definition, and Key Attributes,) that best describes your CoP.

	Stage A	Stage B	Stage C	Stage D	Stage E
<b><u>Fundamental Function</u></b>	Connection	Memory and context creation	Access and learning	Collaboration	Innovation and generation
<b><u>Definition</u></b>	A community is forming.	The community defines itself and formalizes its operating principles.	The community executes and improves its processes.	The community understands and demonstrates benefits from knowledge management and the collective work of the community.	The community and its supporting organization(s) are using knowledge for competitive advantage.
<b><u>Key Attributes</u></b>	Individuals find one another and start coming together.	The organization recognizes the Cop.	The organization interacts with the CoP.	The CoP is solving problems and doing “real” work.	The CoP mentors the formation of new CoPs.
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Assessing the People, Processes, and Technology Capabilities of your CoP**

The following capabilities have been identified as key attributes of Communities of Practice (CoPs) at various stages of evolution. These attributes are grouped into one of three categories; people behavior, process support, and enabling technology. Please review each capability and respond (based on your personal experience) with the extent you see this capability being addressed within the CoP of which you are a member.

#### **EXAMPLE:**

**Bigger heading so they don't get confused.**

**The extent to which...**

My organization ensures CoP members have common issues and interests.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**This example should be non-operational.**

### **Section 3.**

#### **People Behavior**

This survey addresses “people” in a very broad sense. Not only do we want to know about individual social behavior, but group and organizational behaviors as well. For the purposes of this survey, please answer questions 1 through 29 in reference to what is **CURRENTLY** happening in your CoP.

**The extent to which...**

**A question was added so we have to renumber.**

1. I participate in my CoP.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Individuals in my organization find one another and link up.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Individuals in my organization seem unaware of, or uninterested in, the potential CoP.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. My organization provides support to locate and introduce individuals.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **People Behavior**

**The extent to which...**

5. Core CoP members (the small core group who are most active in the CoP) learn about each other.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Core CoP members share experiences and knowledge.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Core CoP members build common vocabulary.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Core CoP members create roles and norms for guiding behavior within the CoP.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. My CoP has started a formal history together and recorded it.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **People Behavior**

**The extent to which...**

10. My CoP has started a repertoire of stories.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. My CoP gets recognized by the organization.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. My CoP recruits new members.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. My CoP demonstrates/models knowledge-sharing behavior.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. My CoP uses community stories (or storytelling) to share knowledge.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **People Behavior**

**The extent to which...**

15. CoP members are developing trust in and loyalty to the community.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. My CoP members commit to the community.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. My CoP members actively search for and contribute material to build the community of practice knowledge base.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. My CoP members promote and participate in knowledge sharing.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. CoP member organizations interact with the CoP and learn of its capabilities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



### **Section 3.**

#### **People Behavior**

**The extent to which...**

20. Individuals within my CoP engage other community members to solve problems and do "real work".

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. My CoP creates focused work groups.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. My CoP connects to and interacts with other communities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. My organization actively supports community work.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. My organization measures community work.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **People Behavior**

**The extent to which...**

25. My CoP contributes to the organizations mission.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. My organization relies on my CoPs knowledge.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. CoP members work together and advance the knowledge, and even the definition, of their area of expertise.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28. My CoP sponsors new communities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. My CoP develops new capabilities so my organization can respond to, and influence, new requirements.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Process Support**

A process is a set of steps that defines the roles and activities that people perform.

For the purposes of this survey, please consider processes that are mostly internal to the community when answering questions 1 through 25.

#### **The extent to which...**

1. My CoP identifies potential community members.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. My CoP helps to locate potential community members.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. My CoP facilitates bringing individuals together.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. My CoP classifies and stores knowledge.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Process Support**

**The extent to which...**

5. My CoP develops ways to support the knowledge life cycle (generate, capture, learn, store, retrieve, and use).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. My CoP plans for community operation (attracting new members, categorizing knowledge, share and manage knowledge, use appropriate technologies, etc.).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. My CoP has started deployment/implementation of the CoP.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. My CoP socializes/indoctrinates new members. (Introduce them to the rules of, and within, the CoP.)

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. My CoP manages workflow (new project initiation, business planning, end-of-project reviews, research and development, etc.).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Process Support**

**The extent to which...**

10. My CoP executes life-cycle processes for developing and managing knowledge.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. My CoP supports tacit knowledge exchange. (Tacit knowledge is the intangible knowledge inside the heads of the CoPs members.)

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. My CoP develops and disseminates communications (sending, receiving, and maintaining information).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. My CoP gathers and manages feedback (from customers, the organization, and themselves).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. My CoP corrects any problems and adjusts (for continuous self-improvement).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Process Support**

**The extent to which...**

15. My CoP re-examines and modifies its definition and scope.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. My CoP practices self-governance and self-regulation.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. My CoP does problem-solving and/or decision-making activities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. My CoP senses and assesses the organizational environment (learns about the effects and effectiveness of the work the CoP does).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. My CoP makes efforts to enhance community learning and feedback processes.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Process Support**

**The extent to which...**

20. My CoP is integrated with organizational processes.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. My CoP is linked with other communities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

22. My CoP adapts responsively to the work environment.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. My CoP develops advanced boundary processes (the CoP has a degree of control over the speed and type of exchanges that occur with customers/peers).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. My CoP mentors the formation of new communities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section 3.**

**Process Support**

**The extent to which...**

25. My CoP focuses on innovation.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



### **Section 3.**

#### **Enabling Technology**

Technology is the application of scientific knowledge to practical problems. As CoPs evolve through stages, they utilize different technologies. For the purposes of this survey please answer questions 1 through 19 in reference to what technologies your CoP is CURRENTLY using.

#### **The extent to which...**

1. My CoP uses electronic messaging systems (e-mail, chat rooms, lists, phone calls, and teleconferences).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. My CoP uses on-line forums.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. My CoP uses on-line directories.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. My CoP has implemented a common repository.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Enabling Technology**

**The extent to which...**

5. My CoP uses initial classification and categorization tools.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. My Cop uses document and library management systems.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. My CoP uses a collaborative work environment.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. My CoP makes use of a portal. (e.g., the Air Force Portal, or a CoP specific portal)

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. My CoP uses expert and community "yellow pages" or locators.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Enabling Technology**

**The extent to which...**

10. My CoP has language translation capabilities.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. My CoP uses electronic surveys, polling, and other feedback tools.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. My CoP makes use of electronic meetings.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. My CoP makes use of collaboration tools, such as for issue-based discussions.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. My CoP makes use of team work rooms.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### **Section 3.**

#### **Enabling Technology**

**The extent to which...**

15. My CoP makes use of analytical and decision-making tools.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

16. My CoP makes an effort to integrate community technology with the applications and technology of the organization.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. My CoP pilots the use of new technology.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. My CoP integrates its technologies with the technologies of external organizations.

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. Perform technology transfer (using technology for a purpose not originally intended).

<b>Not at all</b>	<b>To a little extent</b>	<b>To a moderate extent</b>	<b>To a great extent</b>	<b>To a very great extent</b>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section 4.

## Comments

1. In the space provided below, please tell us if there are any People, Process, or Technology capabilities that were not identified on this survey but you feel are important?
2. In the space provided below, please tell us if there are any People, Process, or Technology capabilities that you feel are unimportant but were identified?
3. What do you think are the critical issues in evolving your CoP to higher levels of maturity and effectiveness?

**THANK YOU FOR YOUR PARTICIPATION.**

Thank you for participating in the Air Force/AFMC Community of Practice Survey. By participating in this survey, you will be helping the Air Force and AFMC better support you and your CoP. If you have any questions or comments about the survey please contact Captain Jason May at [jason.may@afit.edu](mailto:jason.may@afit.edu). If you encountered any problems with the online survey please contact..... Thank you again.

## Appendix B. Perceived Stages of AF/AFMC CoPs

Stage 1 (Potential), Stage 2. (Building), Stage 3. (Engaged), Stage 4. (Active), Stage 5. (Adaptive)		
CoP	Mean of Perceived	Perceived Stage
ACC Special Weapons	1.00	1
ACE Community of Practice	1.00	1
AFMC Portal	1.00	1
AFSPC Space Training	1.00	1
Command Structure	1.00	1
Contracting	1.00	1
DR IMAs	1.00	1
F-15 SPO CoP	1.00	1
Mentoring	1.00	1
MIS CoP	1.00	1
Ramstein Application Development Group	1.00	1
Ramstein Knowledge management	1.00	1
Reliability & Maintainability	1.00	1
USAFE Armament	1.00	1
Weapon System Management Support	1.00	1
Air Force Spacecraft Control Network	1.67	1
Acquisition Center of Excellence	2.00	2
AMATS	2.00	2
Cost Estimating and Analysis	2.00	2
E-Learning for KM	2.00	2
Financial Management	2.00	2
Software Management	2.00	2
TechKnowlegy	2.00	2
Cost	2.33	2
607th Weather Squadron	2.50	2
ACC Armament	2.50	2
FMS PRICING	2.50	2
Inspector General	2.50	2
Acquisition Policy Development & Compliance	2.67	2
AFKM	3.00	3
AFMC Cost Advocates Group	3.00	3
Comprehensive Air Force Technical Order Plan	3.00	3
SAF/FMC O&S Working Group	3.00	3
USAF Deficiency Reporting and Investigating System	3.00	3
Enterprise Leadership	3.25	3
Intelligence in Force Modernization	3.33	3
Software Modification Management	3.50	3
AFMC munitions	4.00	4
Air Force Pricing Assessment	4.00	4
Anti-Tamper Management	4.00	4
ASC Reconnaissance SPO	4.00	4
ASC Simulator Summit	4.00	4
Product Support	4.00	4
AFMC EW Roadmap	5.00	5
FM-KM Task Force	5.00	5
Mean of All Perceived Stages	2.36	2

**Appendix C, Extent of Implementation Results for a Perceived Stage**

	<b>pb = people behavior</b>	<b>ps = process support</b>	<b>et = enabling technology</b>
<b>Perceived Stage 1 (Potential)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
ACC Special Weapons	2.00	1.67	1.00
ACE	2.00	1.00	1.00
AFMC Portal	2.33	2.00	1.33
AFSPC Space Training	1.33	1.00	1.00
Command Structure	2.00	3.67	1.33
Contracting	3.67	3.33	3.33
DR IMAs	2.00	1.00	1.00
F-15 System Program Office	1.33	1.33	1.00
Mentoring	2.33	2.67	2.67
MIS CoP	2.00	2.33	1.67
Ramstein Application Development Group	3.00	4.00	2.67
Ramstein Knowledge management	3.00	4.00	2.00
Reliability & Maintainability	2.33	1.00	1.00
USAFE Armament	2.33	2.33	1.33
WSMS	2.33	2.33	1.67
Air Force Spacecraft Control Network	2.44	2.78	1.67
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.28</b>	<b>2.28</b>	<b>1.60</b>



<b>Perceived Stage 2. (Building)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
Acquisition Center of Excellence	2.14	2.50	2.00
AMATS	3.00	2.50	2.75
Cost Estimating and Analysis	3.00	2.75	2.88
E-Learning for KM	1.86	1.75	1.75
financial management	1.43	1.00	1.25
Software Management	2.00	2.50	2.00
TechKnowlegy	2.00	2.00	2.00
Cost	3.52	3.75	3.50
607th Weather Squadron	2.21	1.75	1.38
ACC Armament	2.00	1.75	2.50
ACC Armament Document Management	2.00	1.25	2.50
FMS Tech Order Pricing IPT	2.39	2.44	2.44
IG	1.43	1.38	2.63
Acquisition Policy Development & Compliance	2.29	2.75	2.67
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.20</b>	<b>2.16</b>	<b>2.28</b>

<b>Perceived Stage 3. (Engaged)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
AFKM	2.54	2.63	2.25
AFMC Cost Advocates Group	2.75	3.00	3.00
AFMC munitions	3.50	3.50	3.50
CAFTOP	2.91	2.83	2.94
Enterprise Leadership	2.94	2.86	3.38
Intelligence in Force Modernization	2.97	2.94	3.00
Munitions Capability Report	2.50	2.67	3.25
SAF/FMC O&S Working Group	3.00	3.33	3.75
Software Modification Management	2.25	2.28	1.50
USAF Deficiency Reporting and Investigating System	2.00	2.33	3.00
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.74</b>	<b>2.84</b>	<b>2.96</b>
<b>Perceived Stage 4. (Active)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
Air Force Pricing Assessment LC200226100	1.43	2.80	3.80
Anti-Tamper Management	2.86	3.80	3.00
ASC Reconnaissance SPO	2.14	1.80	2.40
ASC Simulator Summit	1.86	1.60	2.00
Product Support	3.29	4.00	4.40
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>2.31</b>	<b>2.80</b>	<b>3.12</b>

<b>Perceived Stage 5. (Adaptive)</b>	<b>Extent Scores</b>		
<b>CoP</b>	<b>Mean of pb</b>	<b>Mean of ps</b>	<b>Mean of et</b>
AFMC EW Roadmap	2.00	3.00	2.33
FM-KM Task Force	1.00	3.50	2.00
	<b>Mean of All pb</b>	<b>Mean of All ps</b>	<b>Mean of All et</b>
	<b>1.50</b>	<b>3.25</b>	<b>2.17</b>

## Appendix D. CoPs That Responded To the Research Survey

CoPs	
1	607th Weather Squadron
2	ACC Armament Document Management
3	ACC Special Weapons
4	ACE
5	Acquisition policy Development and Compliance
6	Acquisition Center of Excellence
7	AFKM
8	AFMC Cost Advocates Group
9	AFMC EW Roadmap
10	AFMC munitions
11	AFMC Portal
12	AFSPC Space Training
13	Air Force Pricing Assessment LC200226100
14	Air Force Spacecraft Control Network
15	AMATS
16	Anti-Tamper Management
17	ASC Reconnaissance SPO
18	ASC Simulator Summit
19	CAFTOP
20	Command Structure
21	Contracting
22	Cost
23	Cost Estimating and Analysis
24	DR IMAs
25	E-Learning for KM
26	Enterprise Leadership
27	F-15 System Program Office
28	financial management
29	FM-KM Task Force
30	FMS Tech Order Pricing IPT
31	Intelligence in Force Modernization
32	IG
33	Mentoring
34	MIS CoP
35	Product Support
36	Ramstein Application Development Group
37	Ramstein Knowledge management
38	Reliability & Maintainability
39	SAF/FMC Operations & Support Cost Working Group
40	Software Management
41	Software Modification Management
42	TechKnowlegy
43	USAF Deficiency Reporting and Investigating System
44	USAFE Armament
45	WSMS

## Appendix E. Analysis of Capability Implementation in All Five Stages

CoP	Stage 1 Extent Score	Stage 1 Std Dev	Stage 2 Extent Score	Stage 2 Std Dev	Stage 3 Extent Score	Stage 3 Std Dev	Stage 4 Extent Score	Stage 4 Std Dev	Stage 5 Extent Score	Stage 5 Std Dev	Perceived Stage	Implemented Capabilities from other stages
ACC Special Weapons	1.56	0.73	1.07	0.39	1.74	0.36	1.00	0.00	1.00	0.00	1.00	NA
ACE	1.33	1.00	1.27	0.50	2.17	0.78	1.53	0.80	1.00	0.00	1.00	Y
AFMC Portal	1.89	0.60	1.80	0.75	1.14	0.51	1.59	0.87	1.20	0.63	1.00	NA
AFSPC Space Training	1.11	0.33	1.00	0.00	1.29	0.00	1.00	0.00	1.00	0.00	1.00	NA
Command Structure	2.33	1.12	2.27	0.95	2.73	0.68	2.76	0.83	1.70	1.06	1.00	Y
Contracting	3.44	0.73	3.53	0.91	2.29	0.65	3.88	0.33	1.70	1.16	1.00	Y
DR IMAs	1.33	0.71	1.20	0.39	2.52	0.75	1.35	0.79	1.00	0.00	1.00	Y
F-15 SPO CoP	1.22	0.55	1.00	0.21	2.95	0.30	1.18	0.39	1.00	0.00	1.00	Y
Mentoring	2.56	0.53	2.93	1.18	3.05	1.53	2.00	1.41	1.20	0.63	1.00	Y
MIS CoP	2.00	0.71	1.67	0.55	3.24	0.51	1.47	0.51	1.00	0.00	1.00	Y
Ramstein Application Development Group	3.22	0.97	2.40	0.99	1.52	0.90	2.76	0.83	2.50	0.97	1.00	Y
Ramstein Knowledge management	3.00	1.00	3.13	0.87	1.00	0.62	3.12	0.60	2.60	1.43	1.00	Y
Reliability & Maintainability	1.44	1.33	1.47	0.89	3.19	0.00	1.00	0.00	1.00	0.00	1.00	Y
USAFE Armament	2.00	0.71	1.60	0.70	2.63	0.67	1.06	0.24	1.00	0.00	1.00	Y
WSMS	2.11	0.60	2.47	0.73	2.71	0.87	2.00	0.94	1.40	0.52	1.00	Y
Air Force Spacecraft Control	2.30	0.87	2.82	1.09	2.48	0.81	2.47	1.06	1.80	0.61	1.00	Y
Acquisition Center of Excellence	2.22	0.97	2.20	0.64	2.67	0.72	2.29	0.85	1.30	0.48	2.00	Y
AMATS	3.11	0.60	2.80	0.75	1.29	0.72	2.76	0.83	1.40	0.52	2.00	Y
Cost Estimating and Analysis	2.89	1.32	2.90	1.15	2.88	1.21	2.65	1.28	1.60	1.10	2.00	Y
E-Learning for KM	2.22	0.83	1.93	0.93	2.52	1.12	2.47	1.59	1.60	0.97	2.00	Y
financial management	1.56	0.53	1.27	0.49	3.86	0.51	1.24	0.44	1.20	0.42	2.00	Y
Software Management	2.67	0.50	2.13	0.57	3.48	0.86	1.71	0.69	1.10	0.32	2.00	Y
TechKnowlegy	2.00	0.00	2.00	0.00	2.74	0.00	2.00	0.00	2.00	0.00	2.00	Y
Cost	3.48	1.40	3.58	1.32	1.43	1.22	3.71	1.38	2.77	1.72	2.00	Y
607th Weather Squadron	2.50	0.86	1.87	0.75	2.05	0.63	1.65	0.73	1.45	0.89	2.00	N
ACC Armament	1.61	0.70	2.00	0.78	2.99	0.73	2.12	1.01	1.85	0.88	2.00	Y
FMS PRICING	2.36	1.07	2.42	1.01	1.07	0.59	2.31	0.80	1.98	0.89	2.00	Y

IG	1.94	1.35	1.73	1.09	1.48	1.02	1.47	0.86	1.20	0.89	2.00	NA
<b>CoP</b>	<b>Stage 1 Extent Score</b>	<b>Stage 1 Std Dev</b>	<b>Stage 2 Extent Score</b>	<b>Stage 2 Std Dev</b>	<b>Stage 3 Extent Score</b>	<b>Stage 3 Std Dev</b>	<b>Stage 4 Extent Score</b>	<b>Stage 4 Std Dev</b>	<b>Stage 5 Extent Score</b>	<b>Stage 5 Std Dev</b>	<b>Perceived Stage</b>	<b>Implemented Capabilities from other stages</b>
Acquisition Policy Development	2.33	1.07	2.51	1.07	4.38	1.15	2.49	1.16	1.87	0.82	2.00	Y
AFKM	2.07	0.87	2.13	0.84	2.62	1.46	2.47	1.41	2.00	1.41	3.00	Y
AFMC Cost Advocates Group	2.67	1.12	3.40	1.14	3.22	0.97	3.65	1.06	4.00	1.49	3.00	Y
CAFTOP	2.78	0.87	3.02	0.91	1.67	0.86	3.03	1.13	2.55	1.15	3.00	Y
SAF/FMC O&S Working Group	2.89	0.76	2.60	0.76	2.33	0.51	2.97	0.87	2.10	0.79	3.00	Y
USAF Deficiency Reporting and Investigating System	1.89	0.93	2.53	1.00	1.48	0.73	2.41	1.00	1.30	0.48	3.00	Y
Enterprise Leadership	2.83	1.11	2.85	1.05	2.62	0.73	3.10	1.04	2.23	0.92	3.00	Y
Intelligence in Force	2.48	1.22	3.31	1.31	2.71	0.70	3.43	1.39	2.27	0.98	3.00	Y
AFMC munitions	3.33	1.04	3.31	0.95	3.10	0.82	3.51	0.70	3.20	0.85	3.00	Y
software mod management	2.67	1.50	2.20	1.32	1.00	0.36	2.09	1.31	1.50	0.95	3.00	Y
Air Force Pricing Assessment	3.11	1.36	2.87	1.05	2.74	1.17	2.53	1.46	2.90	1.52	4.00	Y
Anti-Tamper Management	3.22	1.30	2.80	0.95	2.33	1.21	3.18	1.47	1.50	0.53	4.00	Y
ASC Reconnaissance SPO	3.00	0.87	3.40	0.72	2.12	0.97	2.12	0.70	1.80	1.14	4.00	Y
ASC Simulator Summit	2.00	1.00	1.00	0.55	2.00	0.90	1.82	1.29	1.60	1.26	4.00	Y
Product Support	2.56	1.13	1.87	0.95	2.33	1.16	3.82	1.07	2.40	0.97	4.00	Y
AFMC EW Roadmap	3.00	0.87	3.47	0.72	2.43	0.74	2.76	0.66	2.50	0.71	5.00	Y
FM-KM Task Force	3.33	1.22	4.27	1.17	3.10	0.86	4.00	0.94	2.30	1.42	5.00	Y
	<b>Overall mean stage 1</b>	<b>Overall Std Dev Stage 1</b>	<b>Overall mean stage 2</b>	<b>Overall Std Dev Stage 2</b>	<b>Overall mean stage 3</b>	<b>Overall Std Dev Stage 3</b>	<b>Overall mean stage 4</b>	<b>Overall Std Dev Stage 4</b>	<b>Overall mean stage 5</b>	<b>Overall Std Dev Stage 5</b>	<b>Mean perceived stage</b>	<b># Of Yes/No/NA</b>
	2.39	1.14	2.36	1.17	2.38	1.20	2.36	1.27	1.77	1.12	2.20	40 Yes/ 1 No/ 4 NA

## Appendix F, Results of AF/AFMC Perceived Stages

<b>Perceived Stage 1</b>									
CoP	Mean of Perceived Stage	Mean of pb Extent Score	Y/N	Mean of ps Extent Score	Y/N	Mean of et Extent Score	Y/N	Mean of Stage 5	Y/N
ACC Special Weapons	1.00	2.00	N	1.67	N	1.00	N	1.56	N
ACE	1.00	2.00	N	1.00	N	1.00	N	1.33	N
AFMC Portal	1.00	2.33	N	2.00	N	1.33	N	1.89	N
AFSPC Space Training	1.00	1.33	N	1.00	N	1.00	N	1.11	N
Command Structure	1.00	2.00	N	3.67	N	1.33	N	2.33	N
Contracting	1.00	3.67	N	3.33	N	3.33	N	3.44	N
DR IMAs	1.00	2.00	N	1.00	N	1.00	N	1.22	N
F-15 System Program Office	1.00	1.33	N	1.33	N	1.00	N	1.22	N
Mentoring	1.00	2.33	N	2.67	N	2.67	N	2.56	N
MIS CoP	1.00	2.00	N	2.33	N	1.67	N	2.00	N
Ramstein Application Development Group	1.00	3.00	N	4.00	Y	2.67	N	3.22	N
Ramstein Knowledge management	1.00	3.00	N	4.00	Y	2.00	N	3.00	N
Reliability & Maintainability	1.00	2.33	N	1.00	N	1.00	N	1.44	N
USAFE Armament	1.00	2.33	N	2.33	N	1.33	N	2.00	N
WSMS	1.00	2.33	N	2.33	N	1.67	N	2.11	N
Air Force Spacecraft Control Network	1.67	2.44	N	2.78	N	1.67	N	2.30	N
		<b>Mean of All pb</b>		<b>Mean of All ps</b>		<b>Mean of All et</b>		<b>Mean of stage 1</b>	
		<b>2.28</b>	<b>N</b>	<b>2.28</b>	<b>N</b>	<b>1.60</b>	<b>N</b>	<b>2.04</b>	<b>N</b>

Perceived Stage 2									
CoP	Mean of Perceived Stage	Mean of pb Extent Score	Y/N	Mean of ps Extent Score	Y/N	Mean of et Extent Score	Y/N	Mean of Stage 5	Y/N
Acquisition Center of Excellence	2.00	2.14	N	2.50	N	2.00	N	2.20	N
AMATS	2.00	3.00	N	2.50	N	2.75	N	2.80	N
Cost Estimating and Analysis	2.00	3.00	N	2.75	N	2.88	N	2.90	N
E-Learning for KM	2.00	1.86	N	1.75	N	1.75	N	1.93	N
financial management	2.00	1.43	N	1.00	N	1.25	N	1.27	N
Software Management	2.00	2.00	N	2.50	N	2.00	N	2.13	N
TechKnowlegy	2.00	2.00	N	2.00	N	2.00	N	2.00	N
Cost	2.33	3.52	N	3.75	N	3.50	N	3.58	N
607th Weather Squadron	2.50	2.21	N	1.75	N	1.38	N	1.87	N
ACC Armament	2.50	2.00	N	1.75	N	2.50	N	2.07	N
ACC Armament Document Management	2.50	2.00	N	1.25	N	2.50	N	1.93	N
FMS Tech Order Pricing IPT	2.50	2.39	N	2.44	N	2.44	N	2.42	N
IG	2.50	1.43	N	1.38	N	2.63	N	1.73	N
Acquisition Policy Development & Compliance	2.67	2.29	N	2.75	N	2.67	N	2.51	N
		Mean of All pb		Mean of All ps		Mean of All et		Mean of stage 2	
		2.23	N	2.15	N	2.30	N	2.24	N



### Perceived Stage 3

CoP	Mean of Perceived Stage	Mean of pb Extent Score	Y/N	Mean of ps Extent Score	Y/N	Mean of et Extent Score	Y/N	Mean of Stage 5	Y/N
AFKM	3.00	2.54	N	2.74	N	2.58	N	1.38	N
AFMC Cost Advocates Group	3.00	2.75	N	4.56	Y	2.42	N	4.33	Y
CAFTOP	3.00	2.86	N	2.72	N	2.38	N	2.62	N
Enterprise Leadership	3.25	2.96	N	2.86	N	3.25	N	2.92	N
Intelligence in Force Modernization	3.00	2.89	N	3.17	N	3.44	N	3.23	N
SAF/FMC O&S Working Group	3.00	3.00	N	3.22	N	3.75	N	3.48	N
Software Modification Management	3.50	2.25	N	2.22	N	2.42	N	2.23	N
USAF Deficiency Reporting and Investigating System	3.00	1.86	N	3.33	N	2.50	N	3.17	N
		Mean of All pb		Mean of All ps		Mean of All et		Mean of stage 3 for all	
		2.64	N	3.10	N	2.84	N	2.92	N

### Perceived Stage 4

CoP	Mean of Perceived Stage	Mean of pb Extent Score	Y/N	Mean of ps Extent Score	Y/N	Mean of et Extent Score	Y/N	Mean of Stage 5	Y/N
Air Force Pricing Assessment	4	1.43	N	2.80	N	3.80	N	2.53	N
Anti-Tamper Management	4	2.86	N	3.80	N	3.00	N	3.18	N
ASC Reconnaissance SPO	4	2.14	N	1.80	N	2.40	N	2.12	N
ASC Simulator Summit	4	1.86	N	1.60	N	2.00	N	1.82	N
Product Support	4	3.29	N	4.00	Y	4.40	Y	3.82	N
AFMC munitions	4	3.33	N	3.73	N	3.53	N	3.51	N
		Mean of All pb		Mean of All ps		Mean of All et		Mean of stage 4 for all	
		2.48	N	2.96	N	3.19	N	2.83	N

### Perceived Stage 5

CoP	Mean of Perceived Stage	Mean of pb Extent Score	Y/N	Mean of ps Extent Score	Y/N	Mean of et Extent Score	Y/N	Mean of Stage 5	Y/N
AFMC EW Roadmap	5	2.00	N	3.00	N	2.33	N	2.50	N
FM-KM Task Force	5	1.00	N	3.50	N	2.00	N	2.30	N
		Mean of All pb		Mean of All ps		Mean of All et		Mean of stage 5 for all	
		1.50	N	3.25	N	2.17	N	2.40	N

**Appendix G. CoPs Perceive To Be In a More Advanced, Less Advanced, or Same Stage of Maturity  
as Their Responses to Implementation**

CoP	Perceived Stage	Reported Stage (had highest extent score)	Perceived Stage Higher/Lower/Same than Reported Stage
607th Weather Squadron	3	1	H
AFMC EW Roadmap	5	2	H
Air Force Pricing Assessment	4	3	H
AMATS	2	1	H
Anti-Tamper Management	4	1	H
ASC Reconnaissance SPO	4	2	H
ASC Simulator Summit	4	1	H
Financial Management	2	1	H
FM-KM Task Force	5	3	H
Inspector General	4	1	H
Software Management	2	1	H
Software Modification Management	4	1	H
TechKnowlegy	2	1	H
USAF Deficiency Reporting and Investigating System	3	2	H
ACC Armament	2	3	L
ACE Community of Practice	1	4	L
Acquisition Center of Excellence	2	4	L
AFMC Cost Advocates Group	3	5	L
AFMC munitions	3	4	L
Air Force Spacecraft Control Network	1	2	L
Comprehensive Air Force Technical Order Plan (CAFTOP)	2	4	L
Command Structure	1	4	L
Contracting	1	4	L
Cost	1	3	L
DR IMAs	1	3	L
E-Learning for KM	2	4	L
Enterprise Leadership	3	4	L
FMS PRICING	1	3	L
Mentoring	1	2	L
Ramstein Knowledge management	1	2	L
Reliability & Maintainability	1	2	L
WSMS	1	2	L
ACC Special Weapons	1	1	S
Acquisition Policy Development & Compliance	3	3	S
AFKM	3	3	S
AFMC Portal	1	1	S
AFSPC Space Training	1	1	S
Cost Estimating and Analysis	2	2	S
F-15 SPO CoP	1	1	S
Intelligence in Force Modernization	4	4	S
MIS	1	1	S
Product Support	4	4	S
Ramstein Application Development Group	1	1	S
SAF/FMC O&S Working Group	4	4	S
USAFE Armament	1	1	S
	<b>Mean perceived Stage</b>	<b>Mean Reported Stage (had highest extent score)</b>	<b>14 High 31.11%</b>
	<b>2.29</b>	<b>2.38</b>	<b>18 Low 40.00%</b>
			<b>13 Same 28.89%</b>

## Appendix H. Human Subjects Review Approval



### DEPARTMENT OF THE AIR FORCE

AIR FORCE RESEARCH LABORATORY (AFRL)  
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

28 October

2002

MEMORANDUM FOR AFIT/ENV

ATTN: Summer Bartczak

FROM: AFRL/HEH

SUBJECT: Approval for the Use of Volunteers in Research

1. Human experimentation as described in exempt Protocol Request (03-13) FWR 2003-0013-E, "Identifying Critical Success factors for Communities of Practice ", may begin.
2. In accordance with AFI 40-402, this protocol was reviewed and approved by both the Wright Site Institutional Review Board (WSIRB) Chairman on 16 October 2002, the AFRL Chief of Aerospace Medicine on 28 October 2002. A copy of the meeting minutes showing final approval will be forwarded.
3. Please notify the undersigned of any changes in procedures prior to their implementation. A judgment will be made at that time whether or not a complete WSIRB review is necessary.

Signed 28 October 2002  
HELEN JENNINGS  
Human Use Administrator

## Appendix I. AFPC Survey Approval Request

06 Dec 02

MEMORANDUM FOR ASC/HR  
88 SPTG/DP  
AFGE

FROM: AFIT/ENV/GIR

SUBJECT: Survey Approval

- I. Per AFI 36-2601, Air Force Personnel Survey Program, this is a request for approval to conduct a survey of Air Force personnel with regard to their abilities to effectively use computers.
- II. The following information is provided as required by paragraph 2 of AFIT 36-2601:
  - A. Purpose and justification: Air Force Materiel Command (AFMC) is seeking to improve the effectiveness of existing Communities of Practice (CoPs) so that they best serve the participants and the purposes/organizations they evolved to serve. After identifying the enablers of evolution for CoPs, they can be used to improve AFMC's Communities of Practice. This could lead to providing learning and collaborative tools and environments that improve an individuals' capacity to complete their mission.
  - B. Survey results: The results of this study will be provided to the Office of the AF-CIO, AFMC eLearning Knowledge Management IPT Process Owner, Randy N. Adkins, HQ AFMC/DRWD, DSN 986-0822 and published by DITC as Thesis work.
  - C. POC: Capt Jason R. May - Phone (937) 256-1079; Email – jason.may@afit.edu
- 2.4 Population of interest: The population of interest is the Air Force Community of Practice (CoP) Knowledge Owners and Administrators.
- 2.5 Data collection: The data will be collected through a computer-administered survey. A "link" to the survey will be emailed to all 200 people.
- D. Copy of data collection instrument is attached.
- 2.7 Specify when and how often people will be surveyed: People will be surveyed only once starting as soon as possible after 01 January, 2003
3. Request your approval to send an email to approximately 200 Air Force CoP Knowledge Owners and Administrators from 68 different CoPs requesting them to fill out the survey instrument via a website.
4. If you have any questions or comments about this request, please contact me via email at jason.may@afit.edu.

JASON R. MAY, Capt, USAF  
Graduate Student, ENV/GIR

Attachment:  
Survey Instrument

## Bibliography

- Air Force Materiel Command. *AFMC eLearning Knowledge Management IPT Project Charter Version 1.3*: AFMC, 19 June 2002
- APQC. *Building and Sustaining Communities of Practice: Continuing Success In Knowledge Management*, APQC, 2001
- Brailsford, Thomas W. "Building A Knowledge Community At Hallmark Cards" *Research Technology Management*, 44:5 18-25 (Fall 2001)
- Confessore, Sharon J. "Building a Learning Organization: Communities of Practice, Self-Directed Learning, and Continuing Medical Education" *The Journal of Continuing Education in the Health Professions*, 17: 5-11 (1997)
- Cho, George, Hans Jerrell and William Landay. *Program Management 2000: Know The Way: How Knowledge Management Can Improve DoD Acquisition*. Report of the Military Research Fellows; Defense Systems Management College Press, 2000
- Fink, Arlene, *How to Design Surveys*. Sage Publications Inc., 1995
- Fowler, Floyd J., *Survey Research Methods*. Sage Publications Inc., 1984
- Gongla, P and C.R. Rizzuto. "Evolving communities of practice: IBM Global Services experience" *IMB Systems Journal*, 40:4 842-862 (2001)
- Korot, L. & Tovstiga, G. "Organizational Knowledge Practices Survey." Unpublished Survey Instrument. Culver City, CA and Enschede, The Netherlands: Pepperdine University and University of Twente. (2000)
- Lesser, E.L. and J. Storck. "Communities of practice and organizational performance" *IMB Systems Journal*, 40:4 831-841 (2001)
- Lipka, Michael. AFMC Knowledge Now Project Manager, Wright-Patterson Air Force Base, Dayton OH. Personal Correspondence. 17 Dec 2002.
- Litwin, Mark S., *How to Measure Survey Reliability and Validity*. Sage Publications Inc., 1995
- McDermott, R. "Community development as a natural step" *Knowledge Management Review*, 3:5 (November/December 2000)

- McCall, Chester H. "An Empirical Examination of the Likert Scale: Some Assumptions, Development, and Cautions," *Unpublished Proceeding of the 80th Annual CERA Conference*. 15-16 November 2001
- Nguyen, Bao. "Air Force Knowledge Management Practices." Report to Knowledge Management Personnel, USAF, August 2002.
- O'Dell, Carla S. and others. *If We Only Knew What We Know*. Free Press, 1998
- Persaud, Ajax, Uma Kumar and Vinod Kumar. "Harnessing Scientific And Technological Knowledge For The Rapid Deployment Of Global Innovations" *Engineering Management Journal*, 13:1 12-18 (March 2001)
- Pitt, Martyn and Ken Clarke. "Competing on Competence: A Knowledge Perspective on the Management of Strategic Innovation" *Technology Analysis and Strategic Management*, 11:3 (1999)
- Rumizen, M. *The Complete Idiot's Guide To Knowledge Management*. CWL Publishing Enterprises, 2002
- Sawhney, Mohanbir and Emanuela Prandelli. "Communities of Creation: Managing Distributed Innovation In Turbulent Markets" *California Management Review*, 42:4 24-54 (Summer 2000)
- Watkins, K and V. Marsick. *Sculpting the learning organization: lessons in the art and science of systematic change*. San Francisco: Josey-Bass, 1993
- Wenger, Etienne C. "Communities of Practice and Social Learning Systems" *Organization*, 7:2 225-246 (Spring 2000)
- , "Communities of Practice: Learning as a Social System" *The Systems Thinker*, 9:5 (1998a)
- , *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press, 1998b.
- Wenger, Etienne C., Richard McDermott and William M. Snyder. *Cultivating Communities of Practice*. Harvard Business School Press, 2002
- Wenger, Etienne C. and William M. Snyder. "Communities of Practice: The Organizational Frontier" *Harvard Business Review*, 78:1 139-145 (Winter 2000)
- Wesley, Patricia W. and Virginia Buysse. "Communities of Practice: Expanding Professional Roles to Promote Reflection and Shared Inquiry" *Topics in Early Childhood Special Education*, 21:2 114-123 (Summer 2001)

### **Vita**

Captain Jason May was born in 1973 in Norfolk, Nebraska and graduated from Peabody High School, Peabody, Kansas, in 1991. He attended the University of Kansas earning a Bachelor of Science degree in Psychology. He was commissioned through the United States Air Force Reserve Officer's Training Program and entered active service in May 1997.

He has been a communications officer for almost 4 years serving 2 years at Headquarters Air Intelligence Agency, Lackland Air Force Base, Texas.



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<b>1. REPORT DATE (DD-MM-YYYY)</b> 25-03-2003		<b>2. REPORT TYPE</b> <b>Figure #1. Master's Thesis</b>		<b>3. DATES COVERED (From – To)</b> Aug 2002 – Mar 2003	
<b>4. TITLE AND SUBTITLE</b>  AN INVESTIGATION OF AIR FORCE COMMUNITIES OF PRACTICE: A DESCRIPTIVE STUDY OF EVOLUTION THROUGH ASSESSMENT OF PEOPLE, PROCESS, AND TECHNOLOGY CAPABILITIES				<b>5a. CONTRACT NUMBER</b>	
				<b>5b. GRANT NUMBER</b>	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b>  May, Jason R., Captain, USAF				<b>5d. PROJECT NUMBER</b>	
				<b>5e. TASK NUMBER</b>	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)</b> Air Force Institute of Technology Graduate School of Engineering and Management (AFIT/EN) 2950 P Street, Building 640 WPAFB OH 45433-7765				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>  AFIT/GIR/ENV/03-11	
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> Mr. Randy Adkins HQ AFMC/DRO 4375 Chidlaw Road, Suite 6 Wright-Patterson AFB OH 45433-5006  DSN: 986-0822 e-mail: Randy.Adkins@wpafb.af.mil				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>	
<b>12. DISTRIBUTION/AVAILABILITY STATEMENT</b>  APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.					
<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b> A variety of theories state that communities of practice (CoPs) “evolve” or “mature” through various stages over time. Such theories posit that each stage is characterized by different people, processes, and technology attributes/capabilities which ultimately necessitate differing strategies for achieving effectiveness (Gongla and Rizzuto, 2001). A primary goal of AFMC/DRW, AFMC Electronic Learning (eLearning) Knowledge Management Integrated Project Team, and the office of the Air Force Chief Information Officer is to increase CoP participation and effectiveness. This descriptive, cross-sectional research, surveyed all CoP managers of all CoPs “hosted” by AFMC/DRW with a quantitative/qualitative, 86 question, 5-point Likert, survey. This research suggested that, on average, AF/AFMC CoPs are in the very early stages of evolution, and the extent of implementation for stage-specific attributes/capabilities was found to be minimal. The implications of this finding show, given the relatively “undeveloped nature” of many of the CoPs, there are a wide range of actions that can be taken to improve the efficiency and effectiveness of existing CoPs. These actions include increasing leadership involvement and support, increasing membership education and training, defining more clearly the purpose/objectives of each CoP, and implementing easier technology tools for navigating the COP collaborative electronic workspace.					
<b>15. SUBJECT TERMS</b> Community of Practice, Evolution, Collaboration, Collaborative Work Environment, Electronic Workspace, Innovation, Life-cycle, Electronic Learning, Knowledge Management, Attributes, Capabilities, People Behavior, Process Support, Enabling Technology					
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b>
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